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## 1. Introduction

Traditional electronic data interchange (EDI) has been evolving for approximately 25 years and has truly become the paperless environment that is so often talked about. EDI is a complicated mixture of three disciplines: business, data processing, and data communications. This paper examines the concepts from the perspectives of each discipline.

Internet standards are excluded from the discussion of communications protocols, since the audience is probably already familiar with SMTP, MIME, and other Internet messaging protocols.

## 2. What is EDI?

Since EDI is commonly defined as the direct computer-to-computer exchange of standard business forms, it clearly requires a business process. Because the key idea involved is the exchange of documents that allow a business application to take place without human intervention, data processing is clearly necessary for application processing. Data communication is then necessary for the exchange to take place. It is the marrying of these three disciplines that allows the "paperless trading" that comprises EDI technologies.

Besides the three career disciplines that are internal to the organization, three other issues are important for EDI trading to take place: standardization of formats, security, and value-added networks (VANs).

### 2.1 Looking closer at EDI

EDI is commonly defined as the direct computer-to-computer exchange of standard business forms. The key idea involved is the exchange of documents that allow a business application to take place without human intervention. The ability to send business documents between machines simplifies and expedites the business process itself. Many businesses choose EDI as a fast, inexpensive, and safe method of sending purchase orders, requests for quotations, quotations, invoices, payments, and other frequently used business documents.

Often today one will see the term EC/electronic data interchange (EC/EDI). This term has evolved from placing EDI under the EC (EC) umbrella, EC being the broad view of electronic trading. EDI is defined as the

interprocess (computer application to computer application) communication of business information in a standardized electronic form. EC includes EDI, but recognizes the need for interpersonal (human to human) communications, the transfer of moneys, and the sharing of common databases as additional activities that aid in the efficient conduct of business. By incorporating a wide range of technologies, EC is much broader than EDI. However, the focus of this document is on EDI, not EC.

## 2.2 Comparing EDI and fax

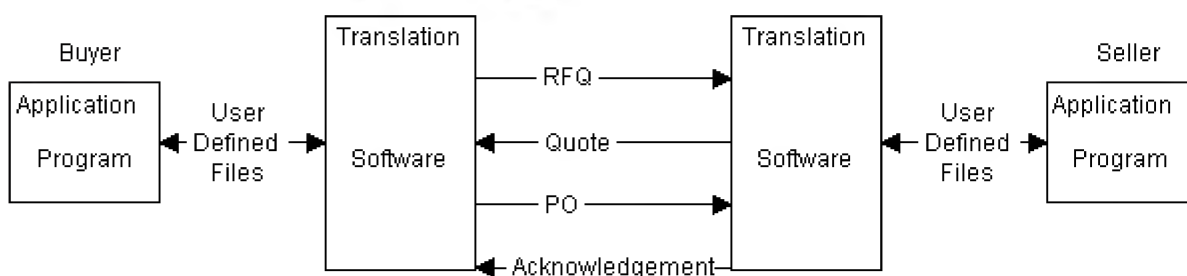
Similarities exist between EDI and fax in that both use telephone lines and both can travel from computer to computer (Sawabini, 1995). There are distinct differences however. Fax is primarily paper based and requires a human interface. Fax receipts are not generally acceptable to applications. Fax machines accept nonstandard data formats, and anything that can be scanned can be faxed, whereas EDI requires standard message formats between trading partners.

## 2.3 Comparing EDI and e-mail

Similarities also exist between e-mail and EDI. Both travel from computer to computer and both use an electronic mailbox. However, three of the four differences listed for EDI vs. fax also apply to EDI vs. e-mail: e-mail message format is not standard, e-mail requires human interface, and e-mail is not acceptable to applications.

## 3. Data processing and EDI

One of the technological fields required to implement EDI is data processing. Data processing allows the EDI operation to take information that is resident in a user application and transform that data into a format that is recognizable to all other user applications that have an interest in using the data. In the EDI environment, data processing will handle both outgoing and incoming data, as depicted in figure 1.



**Figure 1: Data Processing and EDI**

The user-defined files in figure 1 are the flat files that are produced by a business application. These files may or may not be formatted by the user. These are the business files that need to be translated into the X12 format.

The translation software in figure 1 is the software that maps the elements of a user-defined file into the ANSI X12 or EDIFACT standard format. This software is available through commercial retailers on various platforms from PCs to mainframes.

The mapping of the user-defined data elements into the translation software requires some skill in mapping. The mapping itself requires knowledge of both the translation software and the EDI standards being used so new mapping and processing rules can be set up for the translator. If a new trading partner places no new requirements on the translator, the new trading partner is simply set up under existing mapping rules. However, when the trading partner requires that additional or different data fields be sent, a new mapping scheme needs to be identified and associated with that trading partner (Sokol, 1995).

## **4. Data communications and EDI**

The other technological field that is heavily involved in EDI implementation is data communications. Once the standards have been employed and the required software is in place, the EDI participant still needs to have the ability to communicate with remote trading partners to take advantage of EDI.

### **4.1 Transport mechanisms move the data**

Data must be transported across telecommunications lines in order for the trading partners to trade information. Following are some basic concepts that describe mechanisms and methods used in this transport of data:

Direct connect is the term used to indicate that two EDI trading partners trade information directly to each other without a third-party connection service. Direct connects are normally used by large corporations for intracompany EDI transactions and for intercompany transactions with trading partners that have established high-volume rates of exchange of EDI data.

Modems are heavily used by EDI practitioners today. Modem-to-modem connections provide a level of security and reliability that long-time practitioners are reluctant to give up. The standard in the industry, as this paper is written, is transmission by binary synchronous modem or "bisync." This method allows for high-speed continuous transmission in which the sending and receiving modems are controlled by clock pulses. The clock pulses regulate the rate and timing of the data flow.

Routers, although not the primary transport mechanism for EDI transactions today, have the potential to become the de facto standard of transmission for high-volume traffic. Currently, routers are used mainly over leased lines, requiring expensive setups and ongoing data communications transport costs.

### **4.2 Communications protocols standardize the data formats**

EDI transactions can be passed between trading partners using standard transmission protocols. Graphic images, charts, and diagrams must be transmitted using protocols that allow the transfer of binary data. Some of these common standards are SMTP, MIME, X.400, X.435, and X.500. Internet Protocols are excluded from this discussion as the audience is already very familiar with them.

X.400 is an electronic messaging standard that was developed by the Consultative Committee on International Telegraph and Telephone, which is tasked with developing standards to enable incompatible networks and computer systems to exchange data. In this standard, an X.400 header precedes the message itself. The header allows the sender of the message to specify information relating to the transmission and delivery and notice requests.

The architecture of the X.400 standard calls for an outer envelope that is application independent and is used to route the message. Within the outer envelope lies the content header, again application independent, which is used to deliver the message to the recipient. A message transfer agent (MTA) receives the message, discards the outer envelope, and then reads the header to determine the recipient. The message itself is composed of body parts, each body part being an application-specific message.

X.435 is a standard that further enhances the X.400 standard to make it deal more effectively with EDI transmission requirements. X.435 is the specification for the EDI body part that attaches to the X.400 message.

X.500 is an addressing directory containing the names and characteristics of electronic messaging receivers. X.500 facilitates the delivery of X.400 messages, including those that include the X.435 standard. The idea is the production of a global electronic directory and a guide to associated databases so the user can find an e-mail address if it is needed and not known.

## 5. The business process and EDI

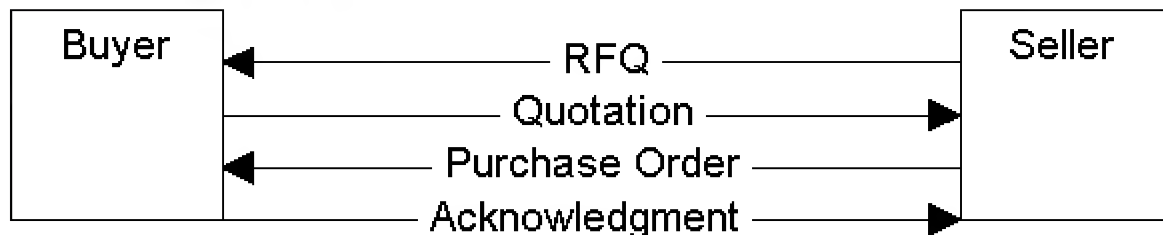
Any business application that can be improved through paperless trading in a fast, efficient environment is a good candidate for EDI. EDI is currently widely used by the airline industry, banking industry, credit card industry, and auto industry. The current push in the EDI world comes from companies who wish to trade with each other electronically--buyers and their suppliers--hence the term "trading partners."

### 5.1 Applications of EDI

The business process examined here to which to apply EDI concepts is the procurement process. This business process was chosen for two reasons. First, within industry itself, new EDI technology is developing fastest in this area. Second, the President has issued an initiative to streamline government procurement through the use of EC. Since the initiative was announced in October 1993, the thrust within the government has been to implement the initiative using EDI technologies. These factors make the procurement process the most relevant business process to examine at this time

### 5.2 A typical small purchasing application

The business application depicted in figure 2 is a simple purchasing application.



and then

**Figure 2: Business Application and EDI**



As shown in figure 2, the procurement process normally begins with the buyer being made aware of a need within the organization to make a purchase. As soon as a need is established and precisely described, the buyer begins the process of selecting the supplier that will be used. Routine items may be purchased using suppliers that have already been contracted with. New items or high-value items may require investigation by the buyer in selecting an appropriate supplier.

The buyer will select a preliminary group of suppliers and then employ the methods of competitive bidding, negotiation, or a combination of the two to secure the final supplier. When competitive bidding is used, the buyer issues an RFQ to the suppliers that the buyer might be willing to do business with. Typically, the RFQ will contain the same basic information that will be included on the purchase order.

When a supplier receives an RFQ that the supplier has an interest in bidding on, the supplier issues a quotation to the buyer. The quotation will contain pricing information so the buyer can do a price comparison between the suppliers. For instance, an RFQ might be issued for 200 gallons of white, latex-based paint. The supplier who is issuing a quotation may quote a price of \$xxx.xx.

Once a supplier has been selected, the purchasing department issues a serially numbered purchase order. The purchase order itself becomes a legally binding contract. For this reason the buyer will carefully prepare the purchase order and ensure that the wording is precise and specific. Any drawings, diagrams, or related documentation that is necessary to precisely describe the item being purchased will be incorporated or referenced in the purchase order. Additionally any conditions or sampling plans will be stated precisely.

Normally a list of terms and conditions designed to give legal protection to the buyer on various matters prescribed by law are incorporated in, or attached to, all purchase orders as boilerplate to those orders. These boilerplate terms and conditions cover a wide range of concerns including, contract acceptance, delivery performance and contract termination, shipment rejections, assignment and contracting on the order, patent rights and infringements, warranties, compliance with regulations, and invoicing and payment procedures.

Change orders are required when a company makes a change in the contract after a purchase order has been issued. The buyer will issue the change order and, when accepted by the supplier, the change order either supplements or replaces the original purchase order.

The original copy of the purchase order constitutes a legal offer to buy. The purchase contract then comes into existence when the contract is performed or when formal acknowledgment of acceptance of the offer is made.

Normal business methods suggest that the supplier may not bother to acknowledge the offer if the items are immediately shipped to the buyer. When the items are not immediately shipped, then the supplier should send the acknowledgment back to the buyer.

The supplier may acknowledge the buyer's order accepting the buyer's terms and conditions, or may acknowledge and incorporate the supplier's own terms and conditions in the acknowledgment. If the seller's terms are different than the buyer's, the law allows them to be incorporated into the contract as long as they do not alter the buyer's intent or unless the buyer files a written objection to the inclusion of new terms and conditions. In general, terms and conditions that are in conflict between buyer and seller are excluded from the contract, leaving the settlement to negotiation or suit. For this reason it is imperative that the buyer beware of the terms and conditions in the order acceptance.

## 6. Marriage of the three disciplines

EDI involves three very different and distinct disciplines. First, there has to be a business process. If the business process would be improved by being accomplished more quickly and with increased efficiency, then the business process is a candidate for EDI. The business process is the domain of the business functional area. Second, once the business process has been identified, data processing technologies have to be applied to the business process so that the process can be handled using computers. Some type of standard must come into play in the automation process so that paper documents that are the output of the business process can be put into a format that is interchangeable between computers. The automation of the business process is the domain of the data processing discipline. Third, the standardized business form must be transmitted from and received by computers, using data communications technologies. The data communications aspect of EDI is the domain of the data communications discipline.

The marriage of these disciplines allows for the "paperless trading" that comprises EDI technologies. As EDI technologies evolve, the terminology changes.

### 6.1 Paper document flow

The traditional document flow for purchasing transactions starts with data entry by the purchaser to create a paper document to send by mail to trading partners. Once the trading partners receive the data, they keystroke the information received into a local application and then perform more data entry by entering a response into a local application. The resultant paper document is then mailed to the purchaser.

The procedure is both time consuming and labor intensive because data from both trading partners has to be entered twice, once at the point of creation and once at the point of entry to the foreign system. In addition, the originator must await a paper response sent by mail.

### 6.2 EDI flow

EDI data is key in only one time, at the original point of entry. The data is then translated into a standard format electronically and sent to the trading partner electronically. At the receiving end, the data fields are mapped into local applications, and the only data entry required is for new data that may be needed to respond to the data received.

Time for transmission is also very fast in comparison to postal mail. Even on a slow modem connection, the time is considerably shorter than through the postal service.

## 7. Standards

Although communications and document standards are both critical, document standards are the heart of EDI (Kimberly, 1991).

### 7.1 The role of standards

Standards are a necessary part of EDI. Every business has application files that are used to manipulate their data in ways that are familiar to the business. The problem is that most businesses, though using the same types of

data, do not use the same application programs or hardware and software platforms. If businesses are to be able to communicate their data to one another, they must have a common ground to meet on to allow the exchange of the information. Standards are the solutions to this problem. All business that conform to specific standards can share data in the formats delineated by those standards.

## **7.2 ANSI ASC X12**

The American National Standards Institute's Accredited Standards Committee X12 (ANSI ASC X12) is the accepted standard for EDI transactions in the United States. The ANSI ASC X12 committee has the mandate to develop variable-length data formats for standard business transactions. The committee was accredited in 1980, and the X12 standard has been evolving ever since. One of the requirements placed on the committee was and is to keep the standard open to interindustry applications. This requirement makes the standard more complex than an industry-specific standard, but the advantages easily overcome the disadvantage of complexity.

With a single standard, a business has multiple functionality and only has to use one standard for each business function.

## **7.3 EDIFACT**

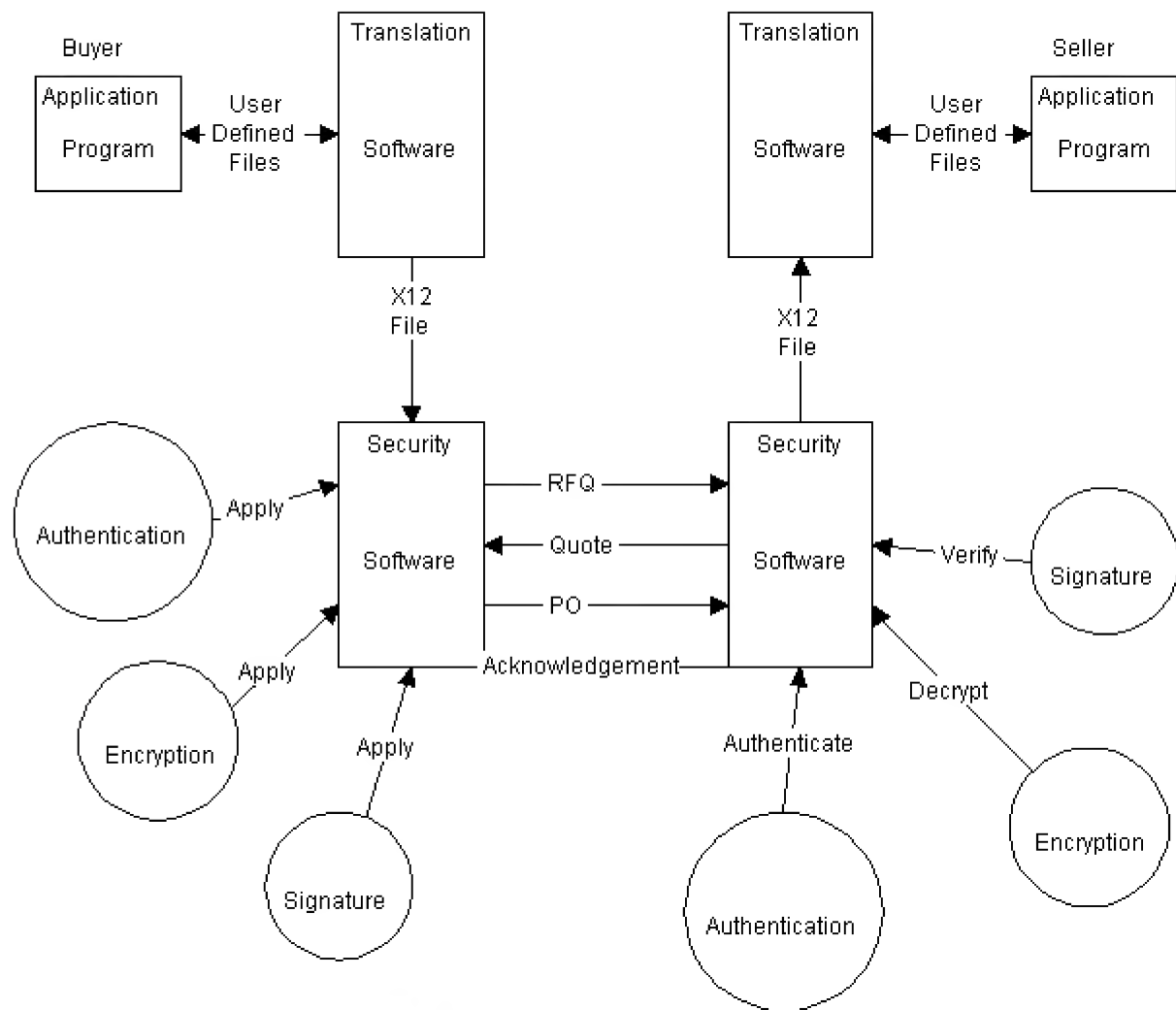
The International Standards Organization (ISO), an organization within the United Nations, has developed the EDI standard that is used in Europe. The Electronic Document Interchange for Administration, Commerce, and Transportation (EDIFACT) is the UN standard that the whole world has agreed to eventually adopt. The actual implementation of EDIFACT within the U.S. has been moving at a snail's pace. The standard appears to currently be taking the same route that metric standards have taken. Everyone agrees that EDIFACT is the international standard, but tried and true X12 standards are not abandoned in favor of EDIFACT.

## **7.4 Other document standards**

Other document standards are in existence, most notably HL7, which is used by the hospital systems and is ANSI approved.

# **8. Security**

One of the major roles that is provided by the data communications technology is the ability to apply security to EDI transactions so that the transactions will not be tampered with or observed, depending on the level of security needed. The security modules that are discussed in this section are depicted in figure 3.



**Figure 3: Data Communications Security**

## 8.1 Confidentiality

Confidentiality requires that all communications between parties are restricted to the parties involved in the transaction. This confidentiality is an essential component in user privacy, as well as in protection of proprietary information and as a deterrent to theft of information services. Confidentiality is concerned with the unauthorized viewing of confidential or proprietary data that one or both of the trading partners does not want known by others. Confidentiality is provided by encryption.

Encryption is the scrambling of data so that it is indecipherable to anyone except the intended recipient. Encryption prevents snoopers, hackers, and other prying eyes from viewing data that is transmitted over telecommunications channels. There are two basic encryption schemes, private-key and public-key encryption. Encryption, in general, is cumbersome and expensive.

Private-key encryption requires that both sending and receiving parties have the same private-encryption keys. The sender encrypts the data using his key. The receiver then decrypts the message using his identical key.



There are several disadvantages to private-key encryption. In order to remain secure, the keys must be changed periodically and the users must be in synch as to the actual keys being used.

Public-key encryption is gaining wide spread acceptance as the preferred encryption technology. With public-key encryption, a message recipient generates a matched set of keys, one public key and one private key. The recipient broadcasts the public key to all senders or to a public location where the key can be easily retrieved. Any sender who needs to send the receiver an encrypted message uses the recipient's public key to encrypt the message. The private key, which is held in private by the recipient is the only key that can decipher messages encrypted with the matched public key. This schema requires that the private key cannot be generated from the public key.

Public key technology is the direction encryption technology is currently headed. With the advent of X.500, databases will be built to store public keys and enhance the technology significantly.

## **8.2 Authentication**

Both parties should feel comfortable that they are communicating with the party with whom they think they are doing business. A normal means of providing authentication is through the use of passwords.

The latest technology to provide authentication is through the use of digital certificates that function much like ID cards. The digital certificate has multiple functions, including browser authentication.

## **8.3 Data Integrity**

Data sent as part of a transaction should not be modifiable in transit. Similarly, it should not be possible to modify data in storage. Data integrity is a guarantee that what was sent by the sender is actually what is received by the receiver. This is necessary if there is a need to ensure that the data has not been changed either inadvertently or maliciously. However, authentication schemes do not hide data from prying eyes.

Providing data integrity is generally cumbersome and not used unless one of the trading partners requires it. The normal mechanism for acquiring data integrity is for the sender to run an algorithm against the data that is being transmitted and to transmit the result of the algorithm separately from the transmission. Upon receipt of the transmission, the receiver runs the identical algorithm and then compares the results. If the results are identical, then data has not been modified.

## **8.4 Nonrepudiation**

Neither party should be able to deny having participated in a transaction after the fact. The current technology ensures this through the use of digital signatures.

Electronic signatures are the computerized version of the signature function. Signatures are needed in some business applications for authorization purposes. For example, a contracting officer may have a specified spending limit, say \$25,000. If that contracting officer decides to place an order for \$30,000, the seller may not have the authority to fill the order because the signature of the contracting officer's supervisor is needed on all orders over \$25,000. The authorization limits normally will have been agreed upon through a trading partner agreement.

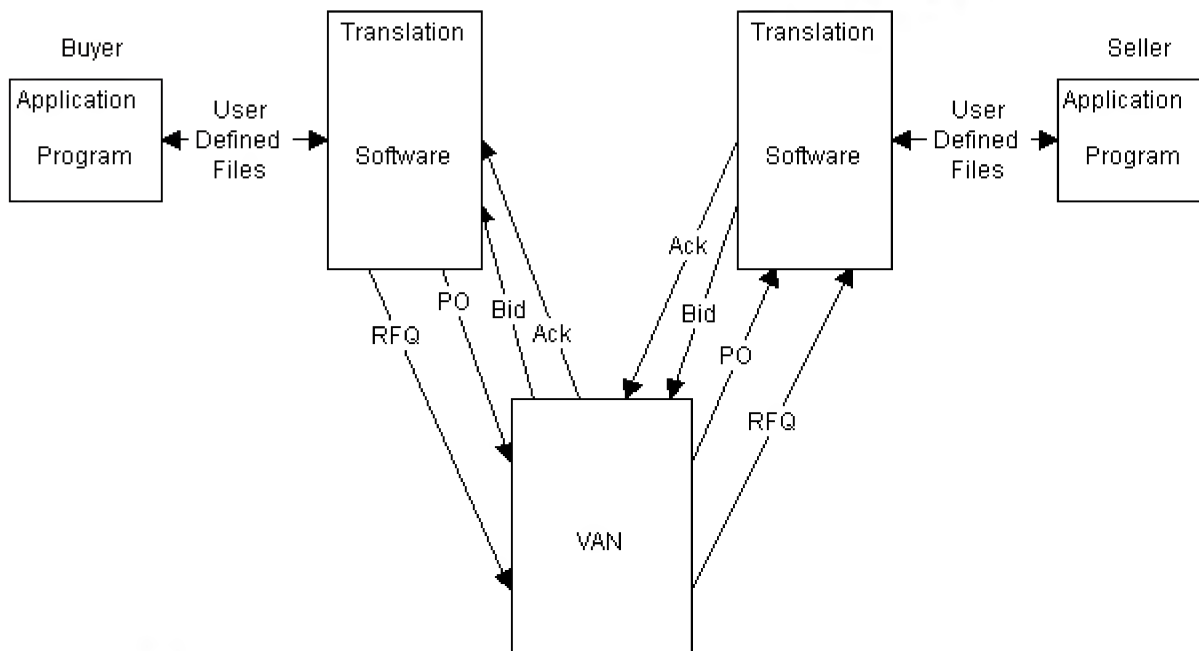
A digital signature algorithm can be used to generate digital signatures. The digital signature itself is used to detect unauthorized modification to data and to authenticate the identity of the signature. The digital signature is also useful to the recipient as a nonrepudiation device whereby the recipient can prove to a third party that the signature was in fact generated by the signatory. Thus the signatory cannot repudiate the signature at a later date.

## 9. Value-added networks

As seen in the previous discussions, setting up to use EDI involves considerable expense. For small businesses and businesses that do low volumes between each other the cost is not always worth the efficiencies achieved. Commercial Value-added networks (VANs) make the burdens of the communications complexities easy by offering their communications services to prospective EDI users (Bort and Bielfeldt, 1996).

### 9.1 Connectivity

VANs establish communications paths between their customers and with other VANs. By using these services a business does not have to worry about the myriad of communications complexities from having trading partners using different hardware, software, and transport mechanisms. The typical buyer-VAN-seller connection is depicted in figure 4.



**Figure 4: Value-Added Network Connection**

Likewise, EDI software is not inexpensive. A business with an X12 translator still needs personnel on board that understand X12 and can use the software effectively. Value-added services offer the traditional VAN services and add to that the translation services required to create an X12 file. These services allow the typical business to enter the EDI arena at minimal cost and maximum efficiency.

## 9.2 Delivery

Mailbox software is the most important feature offered by VANs. The electronic mailbox is used for both store-and-retrieve and store-and-forward operations. In both cases, the sender of the EDI message transmits the electronic message to the VAN on its own time schedule. The VAN then acts on the message depending on whether the service is store-and-retrieve or store-and-forward.

Store-and-retrieve service allows the VAN to store the message in the receiver's mail box. The receiver then retrieves its messages based upon the needs and schedules of the receiver. This service enables the sender and receiver to communicate, but at different times of the day, instead of simultaneously.

Store-and-forward service allows the VAN to forward messages to the receiver when the business need is not for immediate or event-driven notification. Event-driven mailbox services can be handled by forwarding of the message to the receiver or by immediate notification from the VAN to the receiver that a message has been stored that meets the prearranged criteria for event-driven notification.

## 9.3 Security

Generally, a VAN provides security at several levels for its mailbox customers. Access control is normally provided by a login and password sequence.

Messages are screened for the individual customer to ensure that they were sent by authorized trading partners of the customer. This service also checks for message types and formats, and ensures they are acceptable to the customer.

Some VANs offer cryptography services. The cryptography is used to authenticate and encrypt messages to ensure confidentiality. This service requires that the encryption be done at the customer site to be of any real value.

## 9.4 Audit and control

One of the features a VAN can offer a customer is a usage accounting data option whereby the VAN reports how much traffic comes to the customer in a given time period. Transmission status reports to clarify status of an individual transaction are also available (Canis, 1995).

Many trading partners require acknowledgment for transactions received, and VANs can provide automatic sending of acknowledgments. The VAN can also track the transaction traffic. If specific transactions need to be tracked, the VAN can provide an audit trail of the requested data.

## 9.5 Value-added services

In the typical EDI implementation, both sender and receiver employ the services of a VAN because it eliminates the need to support different communications configurations between themselves and their trading partners. Using VANs also reduces the cost of communications equipment and staff to support the multiple configurations.

Still, not all trading partners will use the same VANs. This is not an issue because VANs interconnect regularly with each other. The standard VAN interconnection is through bisynchronous modem connections.

Most VANs offer translation services so that customers do not have the need to purchase or maintain translation software. Normally if these services are used, the customer will supply the formats for the data and the VAN will map the data itself.

VANs have the capability to respond to presence of data and can fax or e-mail a notification to the customer if data is in the customer's mailbox.

## 10. Effects and level of automation

The benefits associated with EDI often cause overblown expectations. EDI, in and of itself, is just another way to format and transfer data. The real use of EDI and the amount of value to be gained from its implementation depend upon whether or not EDI is integrated into the overall data processing effort of the organization.

The effects of EDI depend greatly on the level of automation within an organization. If the organization is only using EDI to send data in a format required by a trading partner, the effect is much more limited than if EDI is integrated into the back-end processes of the organization. EDI applications that are fed by back-end processes and the databases that support these processes and then, in turn, feed the EDI data received back into the databases and back-end processes have a huge impact on the total level of automation within the organization.

The well-known list of EDI-related benefits--lower costs, higher productivity, and reduced order-cycle times--is attainable. But if the automation level of the organization is not high and is not integrated, the effects of EDI will be lessened considerably.

## 11. Conclusions and future of EDI

EDI is well established as effective technology got reducing costs and increasing efficiency. EDI technologies are approximately the same age as Internet technologies. In the past, the technologies have been mutually exclusive, but this is rapidly changing. As the two technological communities begin to merge and as the business community sees the advantages of this merger, EDI and the Internet will eventually become ubiquitous.

EDI users are already seeing dramatic cost savings by moving their traffic from the traditional VAN services to the Internet. As EDI working groups within the Internet Engineering Task Force create interoperability standards for the use of EDI over the Internet and as security issues are addressed, EDI over the Internet will be part of normal business. The EDI working group already has a charter for an interoperability standard for process-to-process EDI. Once that standard is in place, real-time EDI over the Internet will replace normal time-delayed, batch-style interactions.



# **Introduction to E-Commerce**

UNIT 1

# Commerce

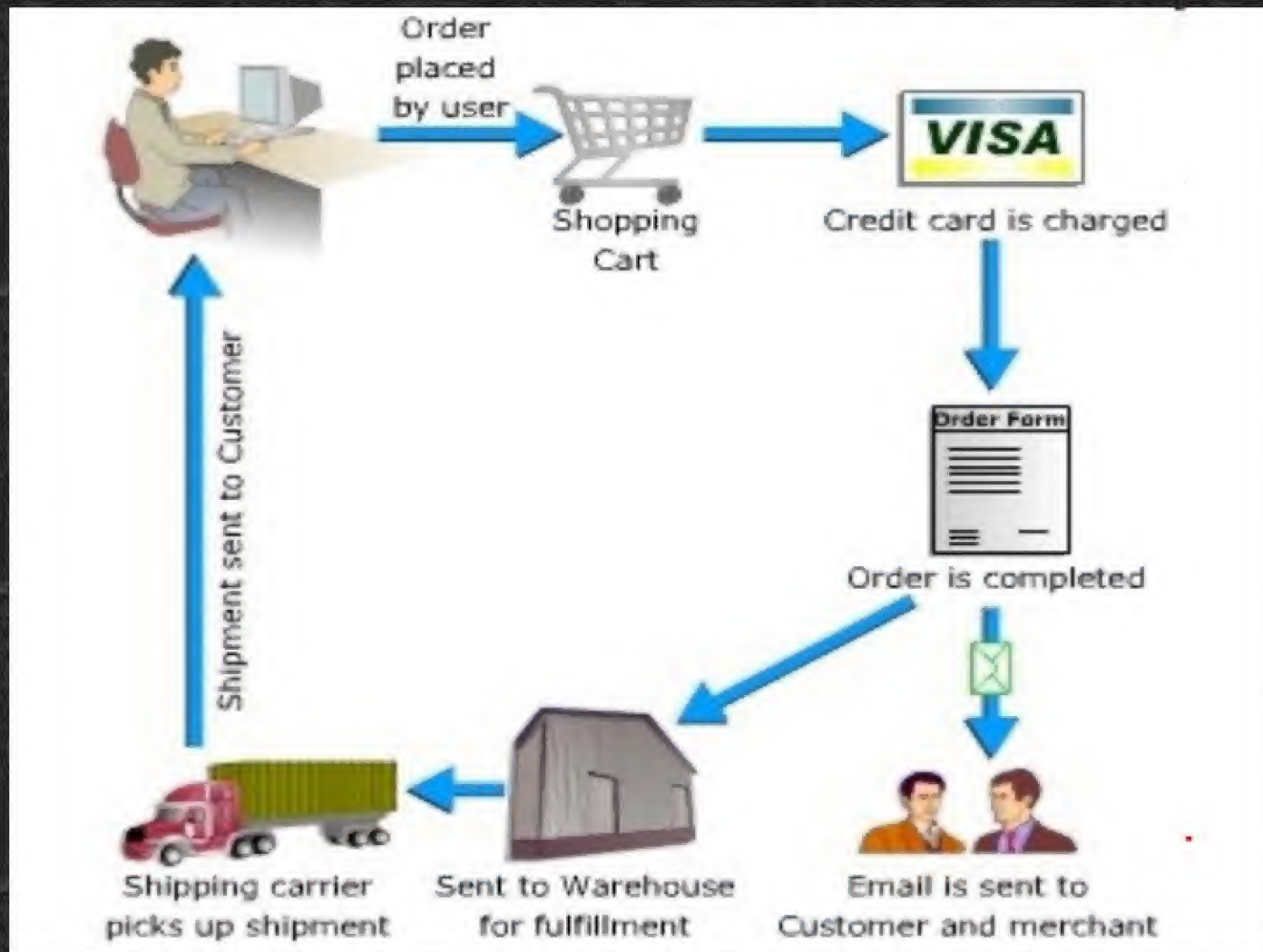
- **Commerce** is a division of trade or production which deals with the exchange of goods and services from producer to final consumer

# E-COMMERCE

- It is commonly known as electronic marketing.
- It consist of buying and selling goods and services over an electronic system such as the internet.
- E-commerce is the purchasing , selling & exchanging goods and services over computer network or internet through which transactions or terms of sale are performed electronically.



# The process of E-commerce





# Traditional Commerce vs. E-Commerce

- Similarities

- Both aim to deliver a valued product or service
- Both want to serve a large audience
- Both strive to quickly deliver products and services

- Differences

- customers expect shorter fulfillment time
- customers must understand Web-based technologies
- E-commerce provides a global audience
- E-commerce orders are processed without human interaction or travel to a store location
- E-commerce relies upon encryption for security

# Traditional Commerce vs. E-Commerce

- **Direct Interaction**
  - based around face to face interaction
- **Lower Costs**
  - E-Commerce is usually much cheaper than maintaining a physical store
- **Reach**
  - restricted to people
- **Returns Rate**
  - restricted to people
- **Credit Card Fraud**



# In E-commerce

- Everything is digital.
- Less overhead costs
- Elimination of the middleman ( disintermediation)
- Financial transactions on the internet can actually be more secure than in traditional retail environments.
- Speed.
- Customer Empowerment
- Personalization.

# ADVANTAGES OF E-COMMERCE

- Faster buying/selling procedure, as well as easy to find products.
- Buying/selling 24/7.
- More reach to customers, there is no theoretical geographic limitations.
- Low operational costs and better quality of services.
- No need of physical company set-ups.
- Easy to start and manage a business.
- Customers can easily select products from different providers without moving around physically.



# Advantages of E-Commerce

- Being able to conduct business 24 x 7
- Reduce cost to buyers
- Reduced cost to the suppliers
- Create New markets-
- Easy market entry
- Increase in variety of goods
- Reduce inventories
- No Middlemen
- E-Payment system
- Ensure secrecy
- Computer platform
- Improved and better customer service
- Teamwork
- Information sharing with the customers
- Customized products
- Swapping of goods and services
- Information sharing
- Global reach
- Advertising of goods and services
- Higher profits-

# DISADVANTAGES OF E-COMMERCE

- Unable to examine products personally
- Not everyone is connected to the Internet
- There is the possibility of credit card number theft
- Mechanical failures can cause unpredictable effects on the total processes.

# e-Commerce Applications

- Supply Chain Management
- Remote banking
- Online Marketing and Advertising
- Home shopping
- Video on demand



# Supply Chain management

- A supply chain is a network of facilities and distribution options that performs the function of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers
- There are 4 major decision areas in SCM
  - Location
  - Production
  - Inventory
  - Transportation (Distribution)

■ Procurement refers to the overall process of acquiring a product or service. Depending on the circumstances, it may include some or all of the following:

- ◆ Identifying a need,
- ◆ Specifying the requirements to fulfill the need,
- ◆ Identifying potential suppliers,
- ◆ Soliciting bids and proposals,
- ◆ Evaluating bids and proposals,
- ◆ Awarding contracts or purchase orders,
- ◆ Tracking progress and ensuring compliance,
- ◆ Taking delivery,
- ◆ Inspecting and inventorying the deliverable, and
- ◆ Paying the supplier.



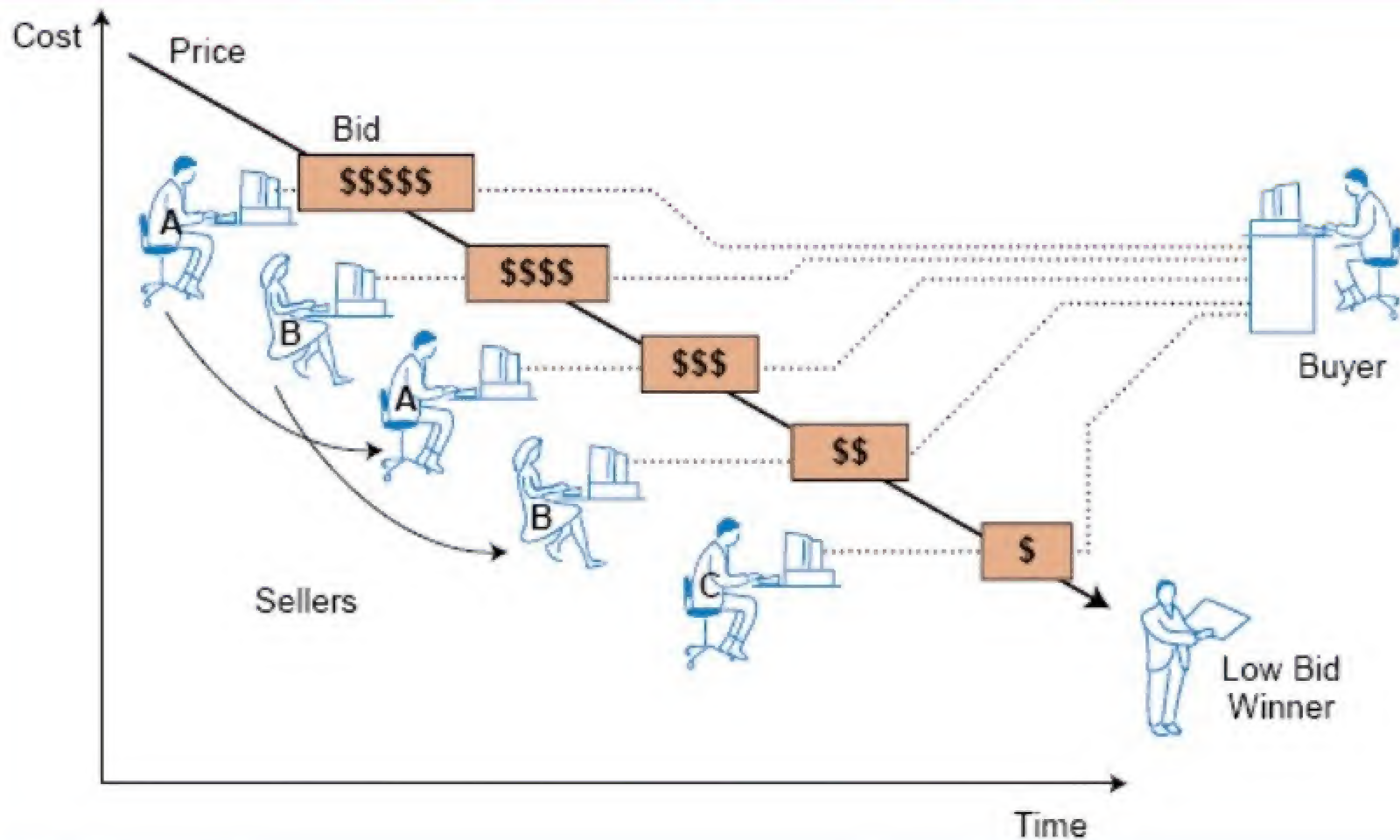


# Online Advertising

- Term referring to the Internet and e-mail based aspects of a marketing campaign, such as banner ads, e-mail marketing, search engine optimization, Pay-Per-Click, and other tools. Also referred to as "Online Advertising."



## THE REVERSE AUCTION PROCESS



# Remote Banking

- Ebankin includes familiar and relatively mature electronically based products in developing markets, such as telephone banking, Credit card, ATM

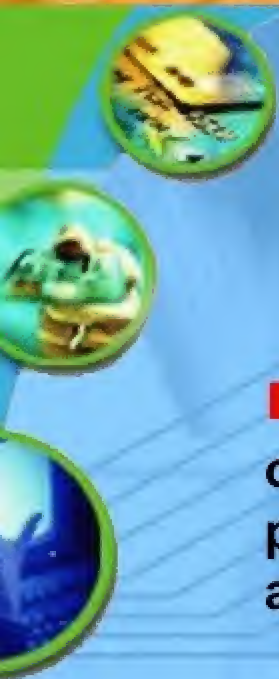


■ E-banking includes familiar and relatively mature electronically-based products in developing markets, such as telephone banking, credit cards, ATMs, Internet banking and direct deposit. It also includes electronic bill payments and products mostly in the developing stage, including stored-value cards (e.g., smart cards/smart money) and Internet-based stored value products.

Among the products offered are:

- ☐ Fund transfer and payment systems;
- ☐ Integrated B2B e-commerce product, involving product selection, purchase order, invoice generation and payment;
- ☐ Securities placement and underwriting and capital market activities;
- ☐ Securities trading; and
- ☐ Retail banking.





■ **Electronic publishing includes the publication of newsletters, online magazines and databases, brochures and other promotional materials, ebooks, and the like. Making information available for use over computer networks.**

**Among the benefits of using online media are**

- **Low-cost**
- **Universal access**
- **The independence of time and place and**
- **Ease of distribution.**

# E-COMMERCE FRAMEWORK





# 1. Network Infrastructure

- “**INFORMATION SUPERHIGHWAY**” (I-Way) is the path through which actual information flows and moves between sender and receiver.
- It consists of telecommunication companies
- Cable TV: provide coaxial cables and direct broadcast satellite networks.
- Wireless companies: provide mobile radio and satellite networks.
- Computer networks include private networks and public data networks like the Internet.
- They are connected with routers, switches, bridges, gateways etc which are devices to connect similar



## 2. Multimedia Contents And Network Publishing

- The Information Superhighway is the transportation foundation that enables the transmission of content.
- The web allows small businesses and individuals to develop content in the form of HTML and publish it on a web server.
- Web provides a means to create product information (content) and a means to publish it in a distribution center. ( network server).

# 3. Messaging And Information Distribution Infrastructure

- The information content transferred over the network consists of text, numbers, pictures, audio and video.
- Once contents has been created and stored on a server, messaging and information distribution methods carry that content across the network.
- Messaging vehicle is called middleware software.
- Messaging and information distribution include translators that interpret and transforms data formats.

## 4. Common Business Services Infrastructure

- facilitating online buying and selling processes.
- the buyers sends an electronic payment as well as some remittance information to the seller.
- Settlement occurs when the payment and remittance information are authenticated by the seller and accepted as valid.
- the payment services infrastructure needs to develop encryption and authentication methods that ensure security of contents traveling on the network.

# 5. Public Policy And Technical Standards

- Public Policy And Technical Standards are two support pillars for all e-commerce applications and infrastructure.
- Public policy related to e-commerce encompasses such issues as universal access, privacy and information pricing.
- Technical Standards dictate the specifics of information publishing tools, user interfaces and transport.
- Standards are essential to ensure compatibility across the entire network of world.



# Benefits of e-commerce to organizations

- *International marketplace*
  - e-commerce enabled, businesses now have access to people all around the world.
- *Operational cost savings*
  - The cost of creating, processing, distributing, storing and retrieving paper-based information has decreased.
- *Mass customization*
  - [www.ford.com](http://www.ford.com)
- *No more 24-hour-time constraints.*
  - Businesses can be contacted by or contact customers or suppliers at any time.

# Benefits of e-commerce to organizations (Cont...)

- *Enables reduced inventories and overheads by facilitating SCM*
  - collecting the customer order and then delivering through manufacturing.
  - Eg: Dell (like color and features)
- *Lower telecommunications cost*
  - It is also cheaper to send a fax or e-mail via the Internet than direct dialing.
- *Digitization of products and processes.*
  - In the case of software and music/video products, which can be downloaded or e-mailed directly to customers via the Internet in digital or electronic format.

# Benefits of e-commerce to consumers

- *24/7 access.*
  - For example, checking balances, making payments, obtaining travel and other information.
- *More choices.*
  - Customers not only have a whole range of products that they can choose from and customize, but also an international selection of suppliers.
- *Price comparisons.*
- *Improved delivery processes.*
  - immediate delivery of digitized or electronic goods
- *An environment of competition*



# Benefits of e-commerce to society

- *Enables more flexible working practices,*
  - work from home.
  - reduces environmental pollution
- *Connects people.*
  - Enables people in developing countries and rural areas to enjoy and access products, services, information and other people which otherwise would not be so easily available to them.
- *Facilitates delivery of public services.*
  - For example, health services available over the Internet, filing taxes over the Internet through the Inland Revenue website.

# Limitations of e-commerce to organizations

- *Lack of sufficient system security, reliability, standards and communication protocols.*
  - There are numerous reports of websites and databases being hacked
  - For example, Microsoft issued security notices and 'patches.'
- *Rapidly evolving and changing technology*
  - always 'catch up' and not be left behind.
- *Under pressure to innovate*
  - develop business models to exploit the new opportunities
  - models can be copied and emulated over the Internet

# Limitations of e-commerce to organizations (Cont...)

- *Facing increased competition*
  - national and international competitors often leads to price wars
- *Problems with compatibility of older and 'newer' technology.*
  - organizations running two independent systems where data cannot be shared.
  - having to invest in new systems or an infrastructure, which bridges the different systems.



# Limitations of e-commerce to consumers

- *Computing equipment*
  - needed for individuals to participate in the new 'digital' economy
- *A basic technical knowledge*
  - navigation of the Internet and the World Wide Web.
- *Cost of access to the Internet*
- *Cost of computing equipment.*
  - technology updated regularly for compatible with Internet, websites and applications.
- *Lack of security and privacy of personal data.*
  - Data protection laws are not universal
- *Physical contact*
  - Customers are unable to touch and feel goods
- *A lack of trust*
  - they are interacting with faceless computers.

# Limitations of e-commerce to society

- *Breakdown in human interaction*
  - people become more used to interacting electronically
- *Social division*
  - people who do not have technical skills become unable to secure better-paid jobs
- *Reliance on telecommunications infrastructure, power and IT skills*
  - power, advanced telecommunications infrastructures and IT skills are unavailable or underdeveloped in developing countries
- *Wasted resources*
  - dispose of all the old computers
- *Facilitates Just-In-Time manufacturing*
  - delivery patterns are based on preset levels of stock which last for days rather than weeks .
- *Difficulty in policing the Internet*

# Types of E-commerce

- B2B (Business-to-Business)
- B2C (Business-to-Consumer)
- C2B (Consumer-to-Business)
- C2C (Consumer-to-Consumer)



# BUSINESS TO BUSINESS (B2B)

- B2B can be open to all interested parties or limited to specific, pre-qualified participants (private electronic market).
- Companies doing business with each other such as manufacturers selling to distributors and wholesalers selling to retailers.



# BUSINESS TO CONSUMER (B2C)

- Businesses selling to the general public typically through catalogs utilizing shopping cart software.
- B2C is the indirect trade between the company and consumers.
- It provides direct selling through online.
- If you want to sell goods and services to customer so that anybody can purchase any products directly from supplier's website.

# CONSUMER TO BUSINESS (C2B)

- A consumer posts his project with a set budget online and within hours companies review the consumer's requirements and bid on the project.
- The consumer reviews the bids and selects the company that will complete the project.
- C2B empowers consumers around the world by providing the meeting ground and platform for such transactions.



# CONSUMER TO CONSUMER (C2C)

- It facilitates the online transaction of goods or services between two people.
- Though there is no visible intermediary involved but the parties cannot carry out the transactions without the platform which is provided by the online market maker such as eBay.

# **Introduction to E-Commerce**

UNIT 2

# Introduction to Information Superhighway (I-Way)

- Information superhighway is also known as interactive or multimedia superhighway
- I-way describes a high-capacity (broadband), interactive (two-way) electronic pipeline
- Information superhighway is the global information
- communications network that includes the Internet and other networks
- switching systems such as telephone networks, cable television networks, and satellite communication networks used for e-commerce and many more other purposes.



# Broadband Technology

- Broadband is defined as a high bandwidth connection to the Internet
- It involves large volumes of information being carried at high speeds to your PC.
- This allows websites, text, graphics, music and videos to be experienced in real time.

# Broadband features

- The connection to the Internet is always on, allowing for constant Internet access and no need to dial up.
- The phone line is unaffected
- Websites, music and videos can be downloaded at a fast rate.
- You can receive uninterrupted real time services

# Types of Broadband Connections:

- 1) Digital Subscriber Line (DSL)
- 2) Cable Modem
- 3) Fiber
- 4) Wireless
- 5) Satellite
- 6) Broadband over Powerlines (BPL)

# 1. Digital Subscriber Line (DSL)

- DSL is a wireline transmission technology that transmits data faster over traditional copper telephone lines already installed to homes and businesses.
- DSL based broadband provides transmission speeds ranging Kbps to Mbps



# Types of DSL transmission technologies

- **Asymmetrical Digital Subscriber Line (ADSL)**
  - customers who receive a lot of data but do not send much
  - faster speed in the downstream than the upstream
- **Symmetrical Digital Subscriber Line (SDSL)**
  - businesses for services which need significant bandwidth both upstream and downstream.
- **High data rate Digital Subscriber Line (HDSL)**
  - Data rate of almost 2Mbps can be achieved without repeaters up to distance 3.6km
- **Very High data rate Digital Subscriber Line (VDSL)**
  - Short distance up to 300 to 1800m
  - Data rate of 50 to 55 Mbps downstream and 1.5 to 2.5 Mbps upstream

## 2. Cable Modem

- Cable modem service enables cable operators to provide broadband using the same coaxial cables
- Most cable modems are external devices that have two connections:
  - one to the cable wall outlet
  - other to a computer.
- They provide transmission speeds of 1.5 Mbps or more.
- You can still watch cable TV while using internet.
- Transmission speeds vary depending on the type of cable modem, cable network, and traffic load.
- Speeds are comparable to DSL.

# 3. Fiber

- Fiber optic technology converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair.
- Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps.
- The actual speed depending on a variety of factors
  - how close to your computer the service provider brings the fiber
  - how the service provider configures the service, including the amount of bandwidth used
- The same fiber providing your broadband can also simultaneously deliver voice (VoIP) and video services, including video-on-demand.

# 4. Wireless

- Wireless broadband connects a home or business to the Internet using a radio link
- Wireless broadband can be mobile or fixed.
- Wireless technologies using longer-range
- Speeds are generally comparable to DSL and cable modem.
- An external antenna is usually required.



# 5. Satellite

- Just as satellites orbiting the earth provide necessary links for telephone and television service, they can also provide links for broadband
- Downstream and upstream speeds depend on:
  - including the provider and service package purchased,
  - the consumer's line of sight to the orbiting satellite,
  - and the weather.
- (download) at a speed of about 500 Kbps and send (upload) at a speed of about 80 Kbps.
- Service can be disrupted in extreme weather conditions

## B) wi-fi (*wireless fidelity*)

- Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections
- **Wi-Fi** or **WiFi** is a technology that allows electronic devices to connect to a wireless LAN (WLAN) network, mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands.
- A WLAN is usually password protected, but may be open, which allows any device within its range to access the resources of the WLAN network.

# C) Wireless Wide Area Network (WWAN)

- A wireless wide area network (WWAN) is a specific type of network that sends wireless signals beyond a single building or property.
- wireless WAN may use various types of cellular network systems to send signals over a longer distance.
- Large telecom providers larger types of networks often require some types of encryption or security that a local area network may not need.

# WWAN (cont...)

- A WWAN often differs from wireless local area network (WLAN) by using mobile telecommunication cellular network technologies such as LTE, WiMAX (often called a wireless metropolitan area network or WMAN), UMTS, CDMA2000, GSM, cellular digital packet data (CDPD) and Mobitex to transfer data.
- It can also use Wi-Fi to provide Internet access.



# D) UMTS

- UMTS – Universal Mobile Telephone System
  - Most popular 3G wireless standard.
  - Combines the infrastructure of the Global System for Mobiles (GSM) network with superior technology of the **Code division multiple access (CDMA)** air interface.
  - GSM carriers put customer information on a removable SIM card. CDMA carriers use network-based white lists to verify their subscribers
- UMTS was originally a European standard.
  - Widely adopted in Japan
    - Approx. complete deployment by the end of 2006.

# 3G

- Third Generation of mobile phones
  - Standard that supports data transfer greater than 2 Mbps. IEEE 802.11 is not a 3G standard
  - Wide area cellular networks that support data-intensive applications.
  - Not just an improvement of 2G networks but it requires new equipment and new frequency bandwidths.

# UMTS Problems

- Web wasn't designed for a 2 inch by 3 inch screen.
  - Inputting information is much more difficult. Voice recognition would help.
- Overweight handsets with poor battery life.
- Poor coverage in the US.
- To support full motion video on demand, base stations will need to setup every 1km, which isn't feasible in rural areas.

## E) What is 4G?

- Fourth Generation Technology
- Faster and more reliable
- 100 Mb/s
- Lower cost than previous generations
- Multi-standard wireless system
- Ad Hoc Networking
- IPv6 Core
- OFDM (Orthogonal frequency-division multiplexing) used instead of CDMA
- Potentially IEEE standard 802.11n
- Most information is proprietary



# Communications Architecture

- **Broadcast layer:**
  - fix access points, (i.e.) cell tower connected by fiber, microwave, or satellite (ISP)
- **Ad-hoc/hot-spot layer:**
  - wireless LANs (i.e. internet at Starbuck's)
- **Personal Layer Gateway:**
  - devices that connect to upper layers; cell phone, fax, voice, data modem, MP3 players, PDAs
- **Info-Sensor layer:**
  - environmental sensors
- **Fiber-optic wire layer:**
  - high speed subterranean labyrinth of fiber optic cables and repeaters

## Enhance Mobile Gaming

- Experience enhance wireless capabilities that deliver mobile gaming interaction with less than five seconds
- Play online multi player games while traveling at high speeds or sitting outside

# Broadband access in Remote location

- 4G will provide a wireless alternative for broadband access
- It will provide first opportunity for broadband access in remote locations without an infrastructure to support cable or DSL access.

# F) Bluetooth

- Bluetooth is a wireless technology for exchanging data over short distances.
- The chip can be plugged into items such as computers, digital cameras, mobile phones and faxes.
- Using a special radio frequency to transmit data, it creates a short range network.
- It is very secure and can connect up to eight devices at the same time.



# Security in Bluetooth

- When any device tries to connect to yours, you - as the user - have to allow it before it can connect.
- In almost all cases, users can establish 'trusted devices' which can exchange data without asking permission.
- You can increase security further by switching on the 'non-discoverable' mode and avoiding connection with other Bluetooth devices.

# Why do we need agents?

- ▶ Increasingly networked, temporary connectivity increasing (wireless).
- ▶ Data overload (e-mail, web pages, fax, ...).
- ▶ Greater exchange of digital information
- ▶ Increasingly dependent upon electronic sources of information
- ▶ Desire to be 'better informed'.

# what is a software agent?

- ▶ Something that acts on behalf of another
- ▶ Is sociable, capable of meaningful interaction with other agents (and humans)
- ▶ Can make decisions on our behalf
- ▶ Is capable of adapting to changing environments and learning from user interaction
- ▶ Is mobile

# A Basic Definition

- ▶ “Intelligent software agents are defined as being a software program that can perform specific tasks for a user and possessing a degree of intelligence that permits it to performs parts of its tasks autonomously and to interact with its environment in a useful manner.”
- ▶ From Intelligent Software Agents Brenner, Zarnekow and Wittig.



# Potential agent rewards: In the Internet

- ▶ **efficiency**: agent is given goal and returns the result;
- ▶ **effectiveness**: agent can terminate search when acceptable solution found. Has a higher degree of multi-threading;
- ▶ **transparency and optimization**: correlation between multiple data sources possible => higher quality results.

# a) Static Agent

- ▶ It Simply sits on computer and actively monitors the environment
- ▶ Static agent do not roam around but use embedded knowledge to assist in filtering and processing of incoming transaction
- ▶ Eg: A mail agent executes in background and is activated only when there is incoming mail message then after processing the mail the agent goes to sleeping state until another event request processing

# Dynamic Agent (Mobile Agent)

- ▶ Dynamic agent can execute command independently while living on a remote server, only reporting back to its home base when the given task is accomplished
- ▶ **Eg:** dynamic agent can search for the cheapest price ticket available for required route on required date, find the amount available on user's bank account, communicate with other agents of different sellers then purchase ticket for its owner by choosing the best deal then lastly notifies the owner

# NETWORK SECURITY





# WHAT IS A NETWORK?

- A **network** has been defined as ``any set of interlinking lines resembling a net, *a network of roads*, an interconnected system, *a network of alliances*."
- a **computer network** is simply a system of interconnected computers.
- **What is the Internet?**
  - The Internet is the world's largest *network of networks* .
  - Internet is a *network of networks* -- not a network of hosts.



# NETWORK SECURITY INTRODUCTION

## ■ Network Security

- process of taking physical and software preventative measures
- protect the underlying networking infrastructure
- from unauthorized access, misuse, malfunction, modification, destruction, or improper disclosure,
- by creating a secure platform for computers, users and programs to perform their permitted critical functions within a secure environment.



- **Network security** consists of the policies adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources.
- Network security involves the authorization of access to data in a network, which is controlled by the **network administrator**



# FACTOR AUTHENTICATION

- Network security starts with authenticating, commonly with a username and a password.
- one detail authenticating the user name—i.e., the **password**—this is sometimes termed **one-factor authentication**.
- **two-factor authentication**, something the user 'has' is also used (e.g., **a security token or 'dongle', an ATM card, or a mobile phone**);
- **three-factor authentication**, something the user 'is' also used (e.g., **a fingerprint or retinal scan**).





# DIMENSIONS OF NETWORK SECURITY

- Access
  - authorized users are provided the means to communicate to and from a particular network
- Confidentiality
  - Information in the network remains private
- Authentication
  - Ensure the users of the network are who they say they are
- Integrity
  - Ensure the message has not been modified in transit



## ■ **Availability**

- Information should be available wherever and whenever requirement within time limit specified.

## ■ **Encryption**

- Information should be encrypted and decrypted only by authorized user.

## ■ **Auditability**

- Data should be recorded in such a way that it can be audited for integrity requirements.

## ■ **Non-repudiation**

- Ensure the user does not deny that he used the network



# CUSTOMER AND MERCHANT PERSPECTIVES ON THE DIFFERENT DIMENSIONS OF E-COMMERCE SECURITY

**TABLE 5.1**

**CUSTOMER AND MERCHANT PERSPECTIVES ON THE DIFFERENT DIMENSIONS OF E-COMMERCE SECURITY**

DIMENSIONS	CUSTOMER'S PERSPECTIVE	MERCHANT'S PERSPECTIVE
Integrity	Has information I transmit or receive been altered?	Has data on the site been altered without authorization? Is data being received from customers valid?
Nonrepudiation	Can a party to an action with me later deny taking the action?	Can a customer deny ordering products?
Authenticity	Who am I dealing with? How can I be assured that the person or entity is who they claim to be?	What is the real identity of the customer?
Confidentiality	Can someone other than the intended recipient read my messages?	Are messages or confidential data accessible to anyone other than those authorized to view them?
Privacy	Can I control the use of information about myself transmitted to an e-commerce merchant?	What use, if any, can be made of personal data collected as part of an e-commerce transaction? Is the personal information of customers being used in an unauthorized manner?
Availability	Can I get access to the site?	Is the site operational?



# E-COMMERCE THREATS

- Intellectual property threats
- Client computer threats
- Communication channel threats
- Server threats





# INTELLECTUAL PROPERTY THREATS

- use existing materials found on the Internet without the owner's permission
- Example:
  - music downloading
  - domain name (cybersquatting)
    - cybersquatting is registering, trafficking in, or using a domain name with bad-faith intent to profit from the goodwill of a trademark belonging to someone else
  - software pirating



# CLIENT COMPUTER THREATS

## ■ Trojan horse

- Trojans appear to be benign programs to the user, but will actually have some malicious purpose.
- Trojans usually carry some payload such as a virus

## ■ Viruses

- Viruses are self-replication programs that use files to infect and propagate.
- Once a file is opened, the virus will activate within the system.



## ■ Active contents

- Active content may require browser plug-ins for execution.
- For example, the RealPlayer plug-in allows Web browser users to watch videos online.
- Active content is mainly used by websites to build animations as well as other interactive features.
- Sadly, it may also be exploited to deliver and execute malicious code on users' computers.
- Active content may automatically be downloaded into users' computers without their knowledge or consent. Also, it can be sent via instant messages and email.
  - Phishing
  - Malware
  - Spyware
  - Hacking
  - Adware



- Java applets, Active X controls, JavaScript, and VBScript, which are programs that interpret or execute instructions embedded in downloaded objects from a Web/commerce server
- Malicious active content can be embedded into seemingly innocuous Web pages
- **Cookies** remember user names, passwords, and other commonly referenced information





# COMMUNICATION CHANNEL THREATS

## ■ **Secrecy Threats:**

- **Secrecy** is the prevention of unauthorized information disclosure. It requires sophisticated physical and logical mechanism to implement
- **Theft** of sensitive or personal information (e-mail address, credit card number) is a significant danger in e-commerce
- **Sniffer** programs can tap into a router of the Internet and record information while it passes from a client computer to a Web server.



## ■ Integrity Threats:

- Also known as active wiretapping
- Unauthorized party can alter data such as changing the amount of a deposit or withdrawal in bank transaction over the Internet
- A hacker can create a mechanism such that all transactions from a Web site redirects to a fake location.

## ■ Necessity Threats:

- Also known as delay or denial threats
- Disrupt normal computer processing
  - Deny processing entirely
  - Slow processing to intolerably slow speeds such that customers get bored not to visit the site anymore.
  - Remove file entirely, or delete information from a transmission or file
  - Divert money from one bank account to another



## ■ Backdoor

- A **backdoor** is a method, often secret, of bypassing normal authentication in a product, computer system, cryptosystem or algorithm etc.

## ■ Spoofing

- a **spoofing attack** is a situation in which one person or program successfully masquerades as another by falsifying data, thereby gaining an illegitimate advantage.

## ■ DoS and dDoS Attacks

- **Denial of service (DoS) attack**: Hackers flood Web site with useless traffic to inundate and overwhelm network
- **Distributed denial of service (dDoS) attack**: hackers use numerous computers to attack target network from numerous launch points

## ■ Viruses:

- self-replicating computer programs designed to perform unwanted events.



- **Worms:**
  - special viruses that spread using direct Internet connections.
- **Trojan Horses:**
  - disguised as legitimate software and trick users into running the program Security (unauthorized access)
- **Passive unauthorized access**
  - listening to communications channel for finding secrets.
  - May use content for damaging purposes
- **Active unauthorized access**
  - Modifying system or data
  - Message stream modification
  - Changes intent of messages, e.g., to abort or delay a negotiation on a contract • Masquerading or spoofing – sending a message that appears to be from someone else.





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# SERVER THREATS

- The more complex a Web server software becomes, the higher the probability that errors (bugs) exist in the code - security holes through which hackers can access.
- Web servers run at various privilege levels:
  - Highest levels provide greatest access and flexibility to a Web user (from a browser)
  - Lowest levels provide a logical fence around a running program
- Secrecy violations occur when the contents of a server's folder names are revealed to a Web browser



- Web site administrators can turn off the “Allow Directory Browsing” feature to avoid secrecy violations
- Cookies requested by a Web server, containing a user’s Userid and Password in a client computer, should never be transmitted unprotected
- **Database Threats**
  - A company database systems store data on user, products, and orders for e-commerce
  - In addition, a company’s valuable and private information could be stored in a company database
  - Security in a database is often enforced through defining the user “privileges” which must be enforced
  - Some databases are inherently insecure and rely on the Web server to enforce security measures



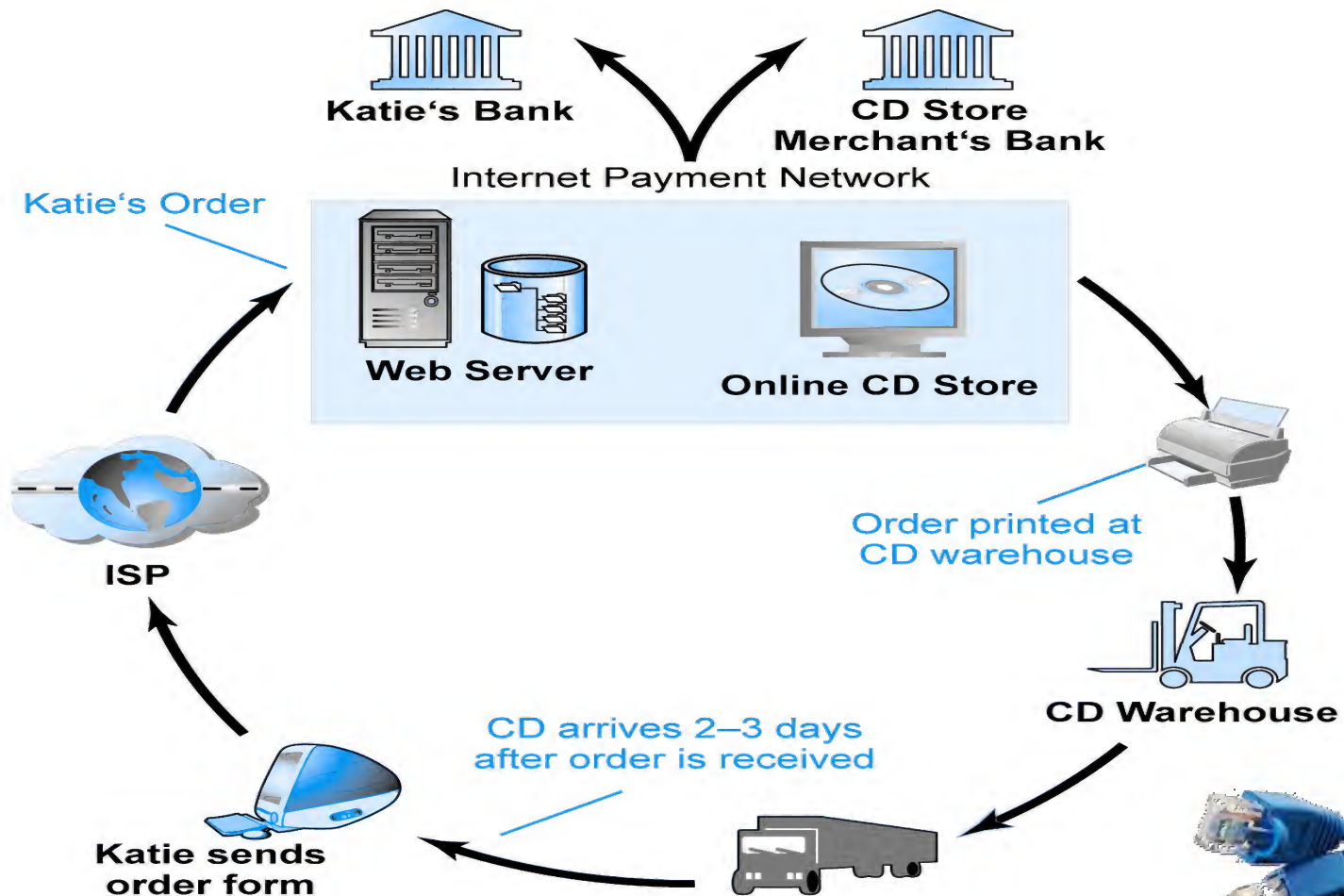
## ■ Common Gateway Interface (CGI) Threats

- CGI programs are programs that present a security threat if misused
- CGI programs can reside almost anywhere on a Web server and therefore are often difficult to track down
- CGI scripts do not run inside a sandbox, unlike JavaScript





# A TYPICAL E-COMMERCE TRANSACTION



# VULNERABLE POINTS IN AN E-COMMERCE ENVIRONMENT

## Security Risks

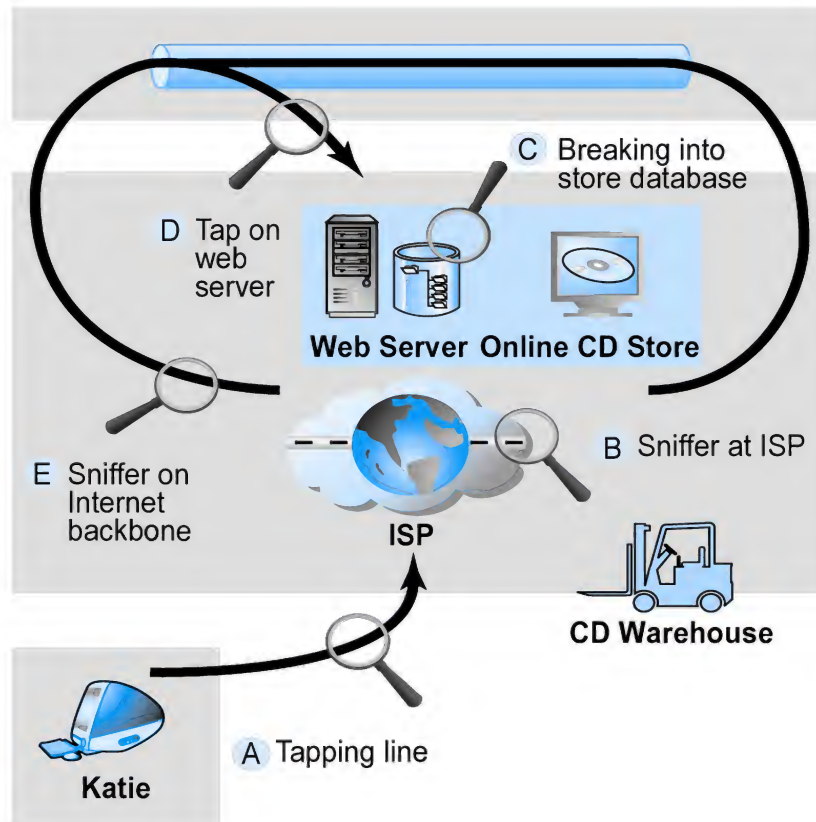
### Internet communications

### Servers

ISP  
Merchant  
Banks

### Clients

Business  
Home



Tapping and sniffing  
Alteration of messages  
Theft and fraud

DoS attack  
Hacking  
Malicious code attack  
Theft and fraud  
Line taps  
Vandalism

Malicious code attack  
Line taps  
Physical loss of computer



# MALICIOUS CODE

- **Viruses**: computer program that has ability to replicate and spread to other files; most also deliver a “payload” of some sort (may be destructive or benign); include macro viruses, file-infecting viruses, and script viruses
- **Worms**: designed to spread from computer to computer
- **Trojan horse**: appears to be benign, but then does something other than expected
- **Bots**: can be covertly installed on computer; responds to external commands sent by the attacker



# PHISHING

- Any deceptive, online attempt by a third party to obtain confidential information for financial gain
  - Most popular type: e-mail scam letter
  - One of fastest growing forms of e-commerce crime





# HACKING AND CYBERVANDALISM

- **Hacker**: Individual who intends to gain unauthorized access to computer systems
- **Cracker**: Used to denote hacker with criminal intent (two terms often used interchangeably)
- **Cyber vandalism**: Intentionally disrupting, defacing or destroying a Web site
- Types of hackers include:
  - White hats
  - Black hats
  - Grey hats



# CREDIT CARD FRAUD

- Fear that credit card information will be stolen deters online purchases
- Hackers target credit card files and other customer information files on merchant servers; use stolen data to establish credit under false identity
- One solution: New identity verification mechanisms



# **INSIGHT ON SOCIETY: “EVIL TWINS” AND “PHARMING”: KEEPING UP WITH THE HACKERS? CLASS DISCUSSION**

- What are “evil twins” and “pharming”
- What is meant by “social engineering techniques?”
- What is the security weakness in the domain name system that permits pharming?
- What steps can users take to verify they are communicating with authentic sites and networks?



# OTHER SECURITY THREATS

- **Sniffing**: Type of eavesdropping program that monitors information traveling over a network; enables hackers to steal proprietary information from anywhere on a network
- **Insider jobs**: Single largest financial threat
- **Poorly designed server and client software**: Increase in complexity of software programs has contributed to an increase in vulnerabilities that hackers can exploit





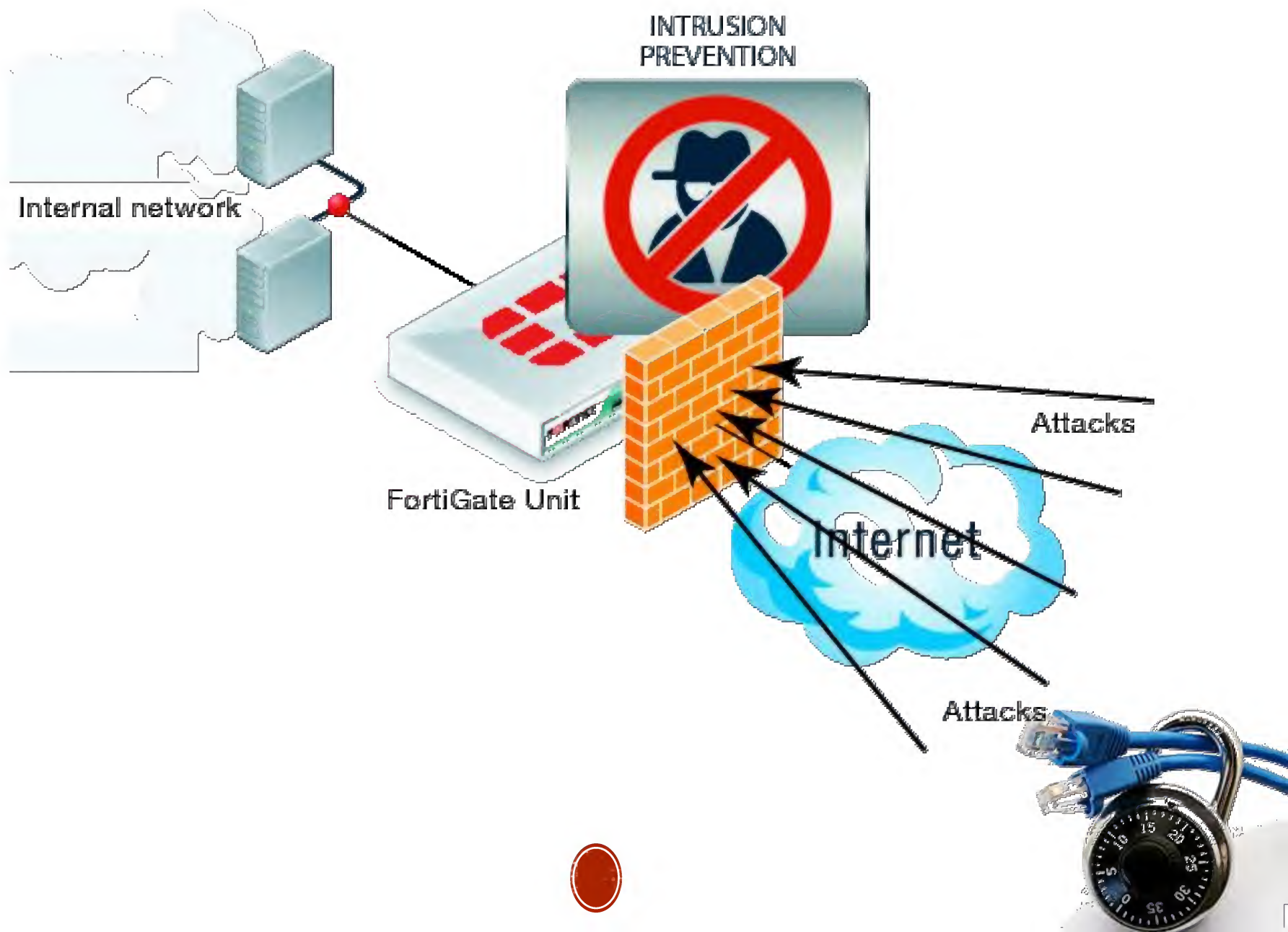
# FIREWALL



# WHAT IS A FIREWALL?

- A **choke point** of control and monitoring
- Interconnects networks with differing trust
- Imposes restrictions on network services
  - only authorized traffic is allowed
- Auditing and controlling access
  - can implement alarms for abnormal behavior
- Itself immune to penetration
- Provides **perimeter defence**





- Middle ground between protected and public nets
- Damage detection and limitation
- Uses
  - Block access
  - Selected prevention
  - Monitor
  - Record
  - Encryption



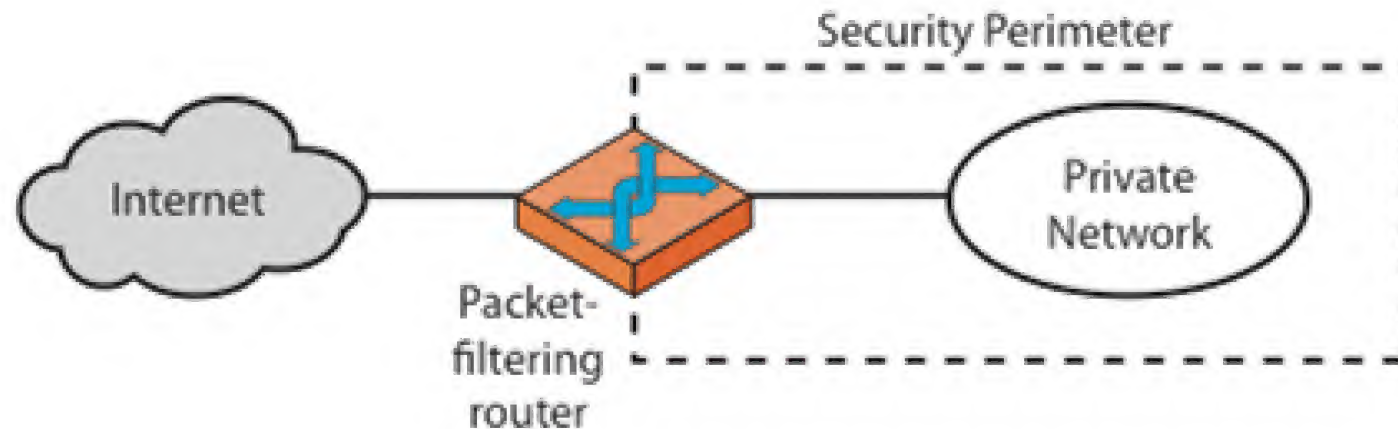


# CLASSIFICATION OF FIREWALL

- Characterized by protocol level it controls in
  - Packet filtering
  - Circuit gateways
  - Application gateways
- Combination of above is dynamic packet filter



# FIREWALLS – PACKET FILTERS



(a) Packet-filtering router



# FIREWALLS — PACKET FILTERS

- Sometime called screening router
- It receives packets and evaluates them according to a set of rules that are usually in the form of access control lists
- These packets may be forwarded to their destinations, dropped, or dropped with a return message to the originator describing what happened.
- most frequently applied are
  - IP Source Address, Destination Address
    - all packets from source address 128.44.9.0 through 128.44.9.255 might be accepted, but all other packets might be rejected



- **Source and destination port**
  - all TCP packets originating from or destined to port 25
  - the simple mail transfer protocol, or SMTP, port
  - might be accepted, but all TCP packets destined for port 79—the finger port—might be dropped).
- **Direction of traffic**
  - inbound or outbound
- **Type of protocol**
  - IP, TCP, user datagram protocol, or internetwork packet exchange
- **The packet's state**
  - SYN, meaning synchronize, or ACK, which is the acknowledgement that a connection between hosts has already been established



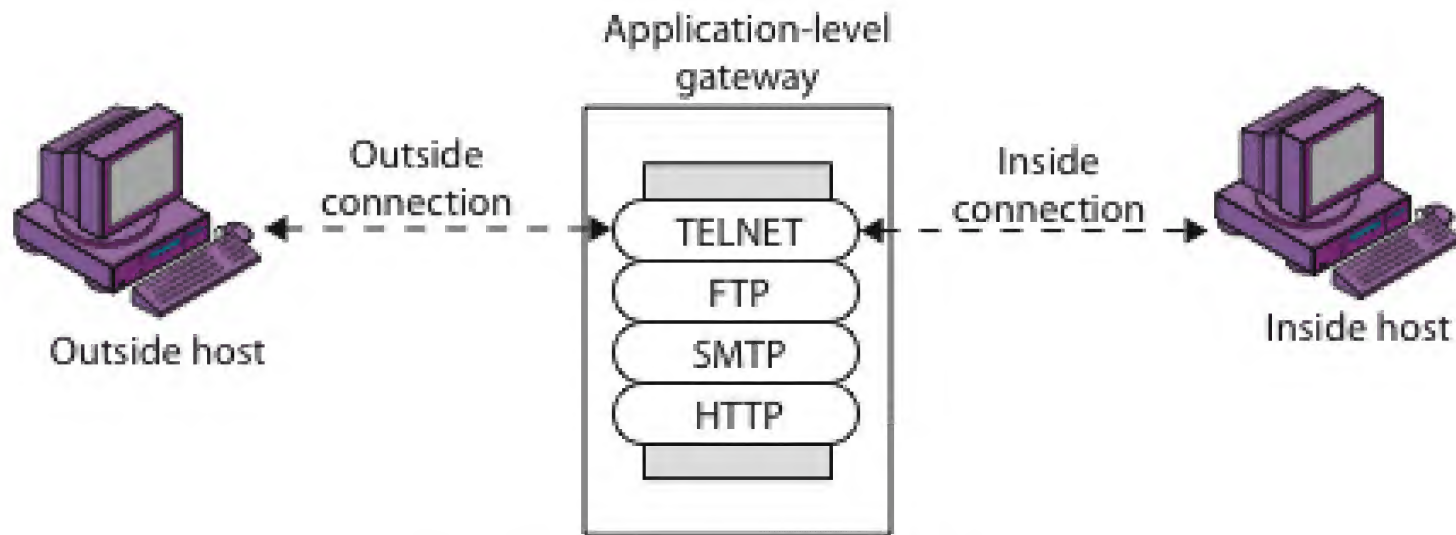


# FIREWALL GATEWAYS

- Firewall runs set of proxy programs
  - Proxies filter incoming, outgoing packets
  - All incoming traffic directed to firewall
  - All outgoing traffic appears to come from firewall
- Policy embedded in proxy programs
- Two kinds of proxies
  - Application-level gateways/proxies
    - Tailored to http, ftp, smtp, etc.
  - Circuit-level gateways/proxies
    - Working on TCP level



# FIREWALLS - APPLICATION LEVEL GATEWAY (OR PROXY)



(b) Application-level gateway

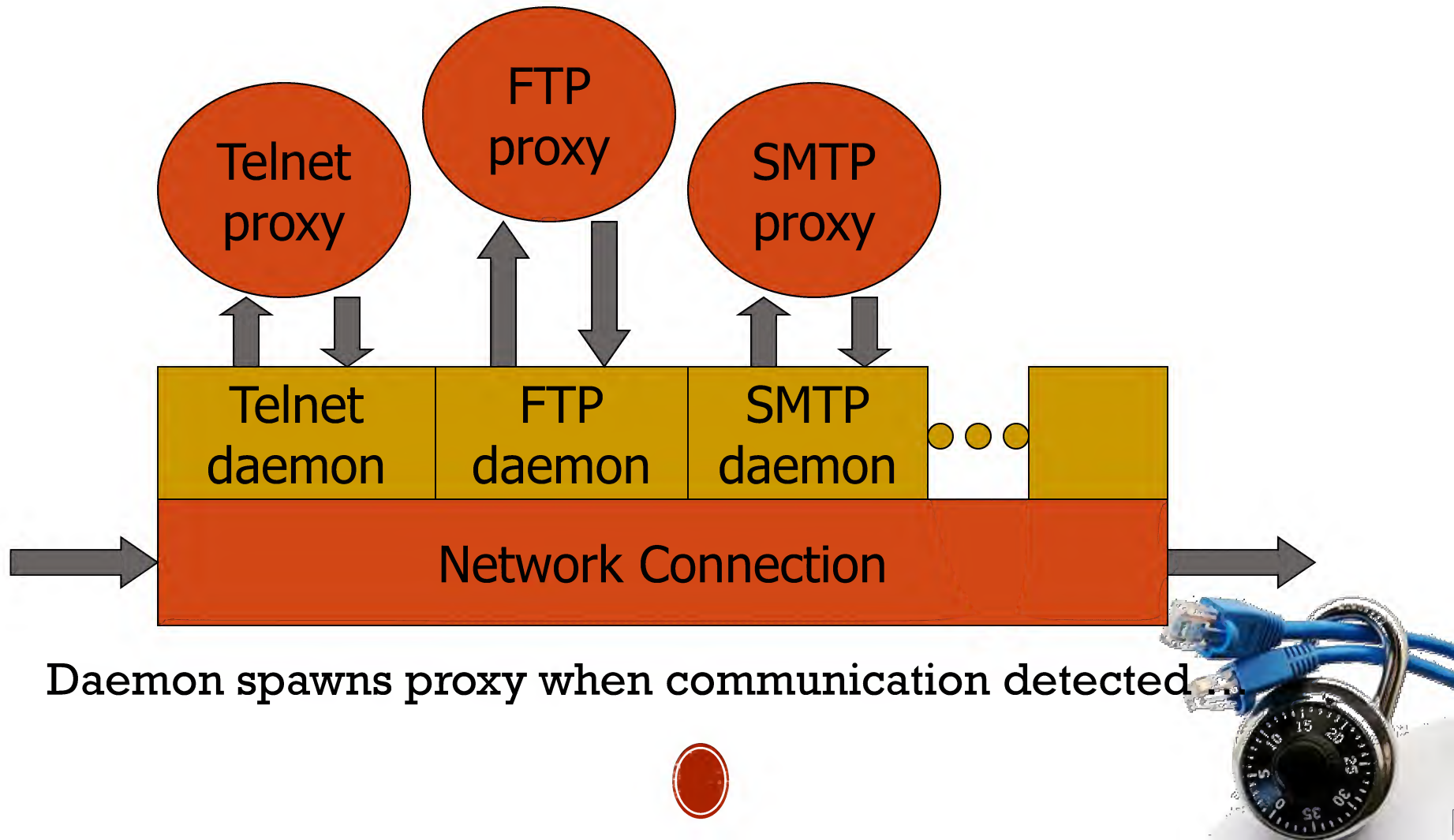


# APPLICATION-LEVEL FILTERING

- Has full access to protocol
  - user requests service from proxy
  - proxy validates request as legal
  - then actions request and returns result to user
- Need separate proxies for each service
  - E.g., SMTP (E-Mail)
  - NNTP (Net news)
  - DNS (Domain Name System)
  - NTP (Network Time Protocol)
  - custom services generally not supported

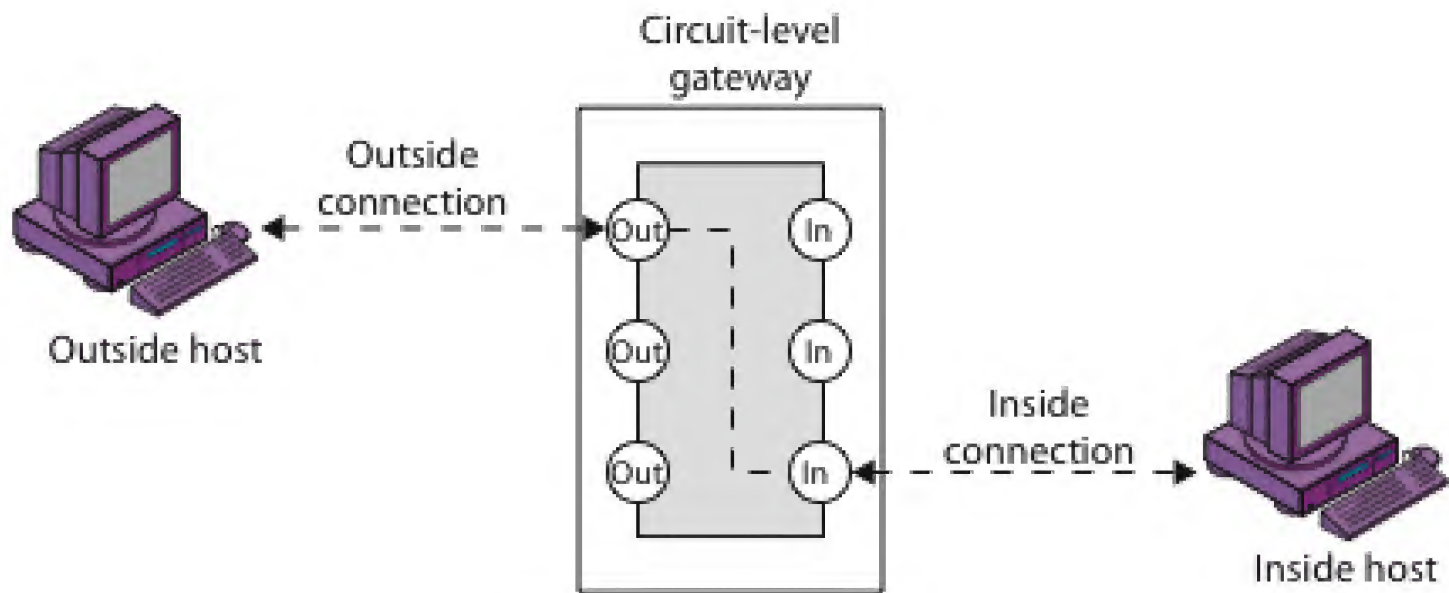


# APP-LEVEL FIREWALL ARCHITECTURE





# FIREWALLS - CIRCUIT LEVEL GATEWAY



(c) Circuit-level gateway



# FIREWALLS - CIRCUIT LEVEL GATEWAY

- Applies security mechanisms when a TCP or UDP connection is established. Once the connection has been made, packets can flow between the hosts without further checking.
- circuit-gateway firewall, has been designed to remedy this limitation by producing a more seamless, transparent connection between clients and destinations using routines in special libraries.
- The connection is often described as a virtual circuit, because the proxy creates an end-to-end connection between the client and the destination application.



- Most circuit-gateway firewalls are implemented using SOCKS, **a tool that includes a set of client libraries for proxy interfaces with clients.**
- SOCKS receives an incoming connection from clients, and if the connections are allowed, it provides the data necessary for each client to connect to the application.
- Each client then invokes a set of commands to the gateway.
- The circuit-gateway firewall imposes all predefined restrictions, such as the particular commands that can be executed, and establishes a connection to the destination on the client's behalf.
- To users, this process appears transparent.



# WHAT IS AN ANTI-VIRUS?

- **Antivirus software is a class of program that searches a hard drive and floppy disk for any known or potential viruses.**
- **Antivirus program runs in the Random Accesses Memory of a computer.**
- **Anti-virus software typically uses two different techniques to accomplish this:**
  - **Examining files to look for known viruses by means of a virus dictionary.**
  - **Identifying suspicious behavior from any computer program which might indicate infection.**
  - **Most commercial anti-virus software uses both of these approaches, with an emphasis on the virus dictionary approach.**





# WHAT IS AN ANTI-VIRUS?

- Anti-virus is a software (computer program) that scans files or your computer's memory for certain patterns that may indicate an infection. The patterns it looks for are based on the signatures, or fingerprints, of known viruses.
- Once a virus is detected in the wild, the Anti-Virus companies then release these new patterns for your Anti-virus software to use.
- These updates come out daily by some vendors.
- Virus authors are continually releasing new and updated viruses, so it is important that you have the latest definitions installed on your computer.



# WHAT IS AN ANTI-VIRUS?

- Once you have installed an anti-virus package, you should scan your entire computer periodically. Always leave your Anti-virus software running so it can provide constant protection.
- **Automatic scans-** Depending what software you choose, you may be able to configure it to automatically scan specific files or directories and prompt you at set intervals to perform complete scans.



# WHAT IS AN ANTI-VIRUS?

- **Manual scans-** It is also a good idea to manually scan files you receive from an outside source before opening them.

This includes: Saving and scanning email attachments or web downloads rather than selecting the option to open them directly from the source. Scanning floppy disks, CDs, or DVDs for viruses before opening any of the files



# HOW DOES AN ANTI-VIRUS WORKS?

- Anti-virus applications maintain a database of known viruses and compare scanned files that match the characteristics of known viruses.
- If a scanned files matches those characteristics of known viruses.
- If a scanned file matches those characteristics, it is quarantined (which means moved to a new, presumably safe location on disk and renamed, so you can find it should you ever need it) so that it cannot affect other files on your system.





# HOW DOES AN ANTI-VIRUS WORKS?

- Signature detection is just one way of identifying viruses and is only effective if the virus database is up-to-date and contains the signature of a virus.
- Anti-virus programs also attempt to identify suspicious behavior include an application attempting to write to an executable file, altering needed system files, making suspicious registry entrees, or adding to the list of items that execute automatically upon system start up.



# HOW DOES AN ANTI-VIRUS WORKS?

- Once the file is quarantined, the application can attempt to repair it, delete it, or prompt you for a decision on what to do about the file infected.
- This approach helps protect against unidentified or encrypted viruses and can alert you to suspicious behavior happening on your computer.
- This interesting is an area where anti-spyware/anti-adware and anti-virus software often notice the same kinds of activities, because they are typical for adware and spyware as well as malware



# WHY DIDN'T MY ANTIVIRUS SOFTWARE WORK?

- It's crucial to keep your antivirus software current with the latest updates (usually called definition files) that help the tool identify and remove the latest threats.
- In addition, not all antivirus tools are the same; if you find that the one you use isn't working to your satisfaction, you should do some research and try an alternative.



# DATA AND MESSAGE SECURITY

- Would you be willing to type in your credit card number knowing the risk?
- Even worse, would you expose your customers to that risk?
- In short, the lack of business transaction security is widely acknowledged as a major impediment to w
- Transaction security issues can be divided into two types:
  - **data security**
  - **message security.**





# DATA SECURITY

- Also, computer industry trends toward distributed computing, and mobile computers, users face security challenges.
- Sniffer attacks begin when a computer is compromised and the cracker installs a packet sniffing program that monitors the network to which the machine is attached.
  - The sniffer program watches for certain kinds of network traffic, typically for the first part of any Telnet, FTP, or login sessions
  - The first part of the session contains the log-in ID, password, and user name of the person logging into another machine, all the necessary information a sniffer needs to log into other machines.



# MESSAGE SECURITY

- Threats to message security fall into three categories:
  - confidentiality,
  - integrity, and
  - authentication.



# ENCRYPTION TECHNIQUES FOR DATA AND MESSAGE SECURITY

- Encryption is a generic term that refers to the act of encoding data, in this context so that those data can be securely transmitted via the Internet.
- Encryption can protect the data at the simplest level by preventing other people from reading the data.
- Encryption technologies can help in other ways as well
  - establishing the identity of users ;
  - control the unauthorized transmission or forwarding of data;
  - verify the integrity of the data
  - ensure that users take responsibility for data that they have transmitted.



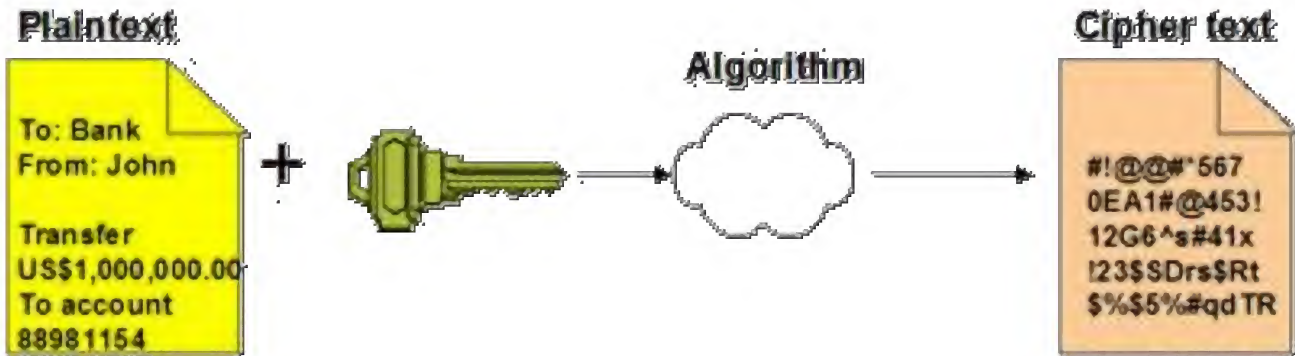
- Encryption can therefore be used either to keep communications secret or to identify people involved in communications
- Encryption Provide Following Security:
  - **Message Integrity:** provides assurance that the message has not been altered.
  - **No repudiation:** prevents the users from denying he/she sent the message
  - **Authentication:** provides verification of the identity of the person (or machine) sending the message.
  - **Confidentiality:** give assurance that the message was not read by others.
- There are two types of encryption:
  - **symmetric key** encryption and
  - **asymmetric key** encryption.



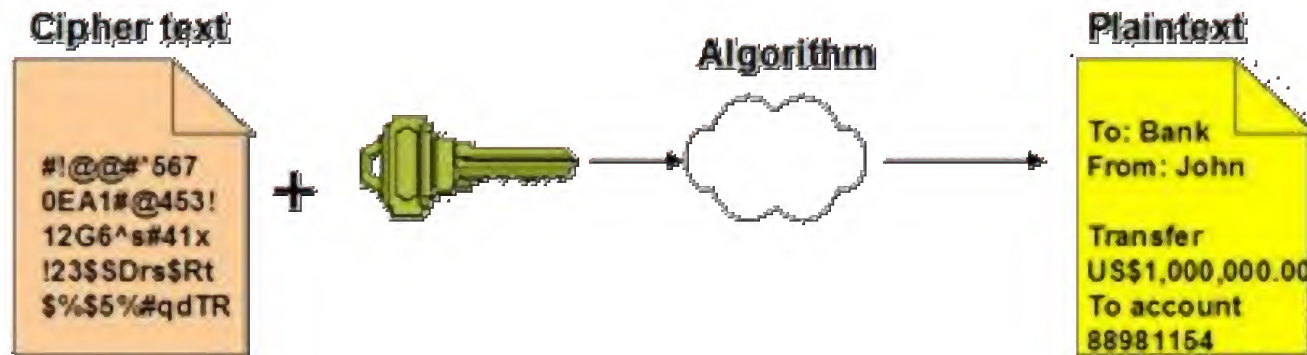


# SYMMETRIC KEY ENCRYPTION (PRIVATE OR SECRET KEY ENCRYPTION):

## Encryption



## Decryption



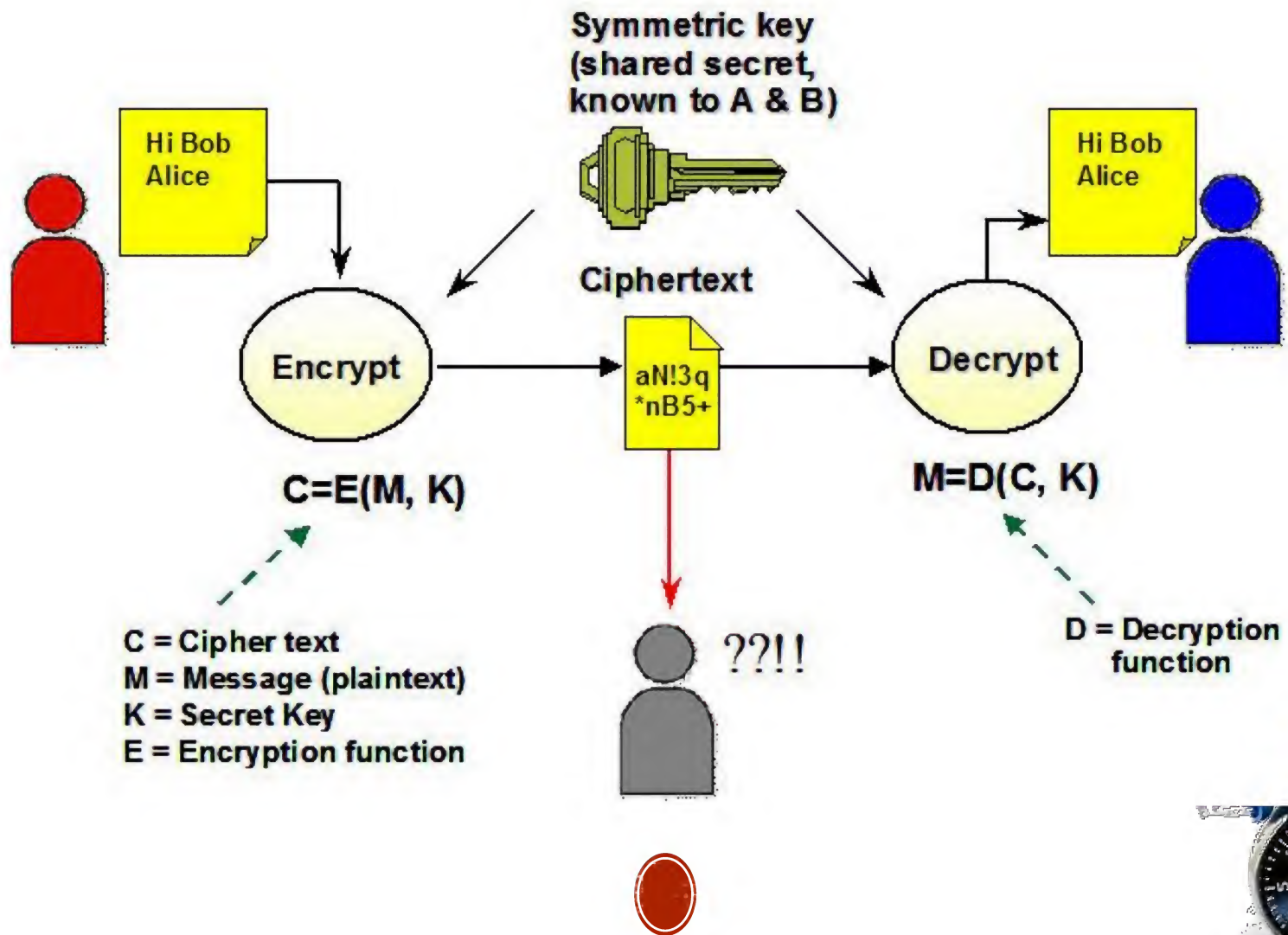
- Encryption algorithms that use the same key for encrypting and for decrypting information are called **symmetric-key algorithms**.
- The symmetric key is also called a secret key because it is kept as a shared secret between the sender and receiver of information.
- Symmetric key encryption is much faster than public key encryption, often by 100 to 1,000 times. Symmetric key technology is generally used to provide secrecy for the bulk encryption and decryption of information.
- Cryptography-based security technologies use a variety of symmetric key encryption algorithms to provide confidentiality.
- Symmetric algorithms have the advantage of not consuming too much computing power.



- People can use this encryption method as either a "**stream**" cipher or a "**block**" cipher, depending on the amount of data being encrypted or decrypted at a time.
- A stream cipher encrypts data one character at a time as it is sent or received,
- a block cipher processes fixed block (chunks) of data.
- Common symmetric encryption algorithms include Data Encryption Standard (DES), Advanced Encryption Standard (AES), and International Data Encryption Algorithm (IDEA).



# ASYMMETRIC KEY ENCRYPTION(PUBLIC KEY ENCRYPTION):





- Encryption algorithms that use different keys for encrypting and decrypting information are most often called public-key algorithms but are sometimes also called ***asymmetric key algorithm***.
- Public key encryption requires the use of both a private key (a key that is known only to its owner) and a public key (a key that is available to and known to other entities on the network).
- A user's public key, for example, can be published in the directory so that it is accessible to other people in the organization.
- Information that is encrypted with the public key can be decrypted only with the corresponding private key of the set.



- Today, public key encryption plays an increasingly important role in providing strong, scalable security on intranets and the Internet. Public key encryption is commonly used to perform the following functions:
  - Encrypt symmetric secret keys to protect the symmetric keys during exchange over the network.
  - Create digital signatures to provide authentication and non-repudiation for online entities.
  - Create digital signatures to provide data integrity for electronic files and documents.



# Organizational Behaviour

## Concept of OB

- Organization are combination of humanity and technology.
- Organizations are social systems.
- OB is nothing more than developing our understanding and development of people skill.
- OB is multidisciplinary field devoted to understanding individual and group behavior, interpersonal processes, and organizational dynamics.
- OB is Study of human behavior in organizations.
- OB is the study and application of knowledge about how people act within the organization.
- It is a human tool for human benefit .

OB can be classified into four areas:

1. People
2. Structure
3. Technology
4. Environment

When **people** join the organization to accomplish the goals/ objectives, some kind of **structure** is required. They use machinery, gadgets & **technology** to achieve the organizational goals. At the same time they are influenced by external **environment**.



## **Definitions of OB**

Organizational Behavior is the study of individuals and their behavior within the context of the organization in a workplace setting. It is an interdisciplinary field that includes sociology, psychology, communication and management.

The study of organizations and of the collection of people within them together comprises the field of organizational behavior. Organizational behavior (OB) is the study of human behavior in organizational settings, the interface between human behavior and the organization, and the organization itself.

Organizational Behavior is a field of study that investigates the impact that individuals, groups, and structure have on behavior within organizations for the purpose of applying such knowledge towards improving an organization's effectiveness.

- OB is directly concerned with the understanding, predicting and controlling of human behavior in organizations. – **Luthans**
- The study and application of knowledge about human behaviour related to other elements of an organization such as structure, technology and social systems. - **LM Prasad**
- Organizational behaviour as a systematic study of the actions and attitudes that people exhibit within organizations. - **Stephen P Robins**
- O.B as a branch of the social science that seeks to build theories that can be applied to predicting understanding and controlling behavior in work organizations. - **Roman J. Alday**
- “Organizational behaviour is a field of study that investigates the impact that individuals, groups and organizational structure have on behaviour within the organization, for the purpose of applying such knowledge towards improving an organizational effectiveness.

## Features of OB

- 1) **A separate field of study and not a discipline only** It has assumed the status of a distinct field of study. It is a part of general management. It represents behavioral approach to management.
- 2) **An inter-disciplinary approach** The OB is heavily influenced by several other behavioral sciences and social sciences like psychology, Sociology and anthropology. OB has psychological foundations. The concept like learning, perception, attitude, motivation etc is borrowed from psychology, sociology and anthropology.
- 3) **A Normative Science** Organizational behaviour is a normative science. A normative science prescribes how the various findings of researches can be applied to get organizational results, which are acceptable to the society. Thus, what is acceptable by the society or individuals engaged in an organization is a matter of values of the society and people concerned.

- 4) **A Science and Art Organization** behavior is both art and science. It is considered as art because it contains knowledge about behavior of individuals. It is considered as science because it involves application of science.
- 5) **Humanistic and Optimistic Approach** Organizational behaviour focuses the attention on people from humanistic point of view. It is based on the belief that needs and motivation of people are of high concern. Further, there is optimism about the innate potential of man to be independent, creative, predictive and capable of contributing positively to the objectives of the organization.
- 6) **Oriented towards Organizational Objectives** Organizational behaviour is oriented towards organizational objectives. In fact, organizational behaviour tries to integrate both individual and organizational objectives so that both are achieved simultaneously.
- 7) **A Total System Approach** An individual's behaviour can be analyzed keeping in view his psychological framework, interpersonal-orientation, group influence and social and cultural factors; Thus, individual's nature is quite complex and organizational behaviour by applying systems approach tries to find solutions for this complexity..

## **Contributing Fields to Organizational Behaviour**

**Psychology:** Psychology is an applied science, which attempts to explain human behaviour in a particular situation and predicts actions of individuals. Psychologists have been able to modify individual behaviour largely with the help of various studies. It has contributed towards various theories on learning, motivation, personality, training and development, theories on individual decision making, leadership, job satisfaction, performance appraisal, attitude, ego state, job design, work stress and conflict management. Studies of these theories can improve personal skills, bring change in attitude and develop positive approach to organizational systems. Various psychological tests are conducted in the organizations for selection of employees, measuring personality attributes and aptitude. Various other dimensions of human personality are also measured. These instruments are scientific in nature and have been finalized after a great deal of research.



**Sociology:** Science of Sociology studies the impact of culture on group behaviour and has contributed to a large extent to the field of group-dynamics, roles that individual plays in the organization, communication, norms, status, power, conflict management, formal organization theory, group processes and group decision-making.

**Political science:** Political science has contributed to the field of organizational behaviour. Stability of government at national level is one major factor for promotion of international business, financial investments, expansion and employment. Various government rules and regulations play a very decisive role in growth of the organization. All organizations have to stand by the rules of the government of the day.

**Social psychology:** Working organizations are formal assembly of people who are assigned specific jobs and play a vital role in formulating human behaviour. It is a subject where concept of psychology and sociology are blend to achieve better human behaviour in organization. The field has contributed to manage change, group decision-making, communication and ability of people in the organization, to maintain social norms.

**Anthropology:** It is a field of study relating to human activities in various cultural and environmental frameworks. It understands difference in behaviour based on value system of different cultures of various countries. The study is more relevant to organizational behaviour today due to globalization, mergers and acquisitions of various industries. The advent of the 21st century has created a situation where in cross-cultural people will have to work-in one particular industry. Managers will have to deal with individuals and groups belonging to different ethnic cultures and exercise adequate control or even channelize behaviour in the desired direction by appropriately manipulating various cultural factors. Organization behaviour has used the studies on comparative attitudes and cross-cultural transactions. Environment studies conducted by the field of anthropology aims to understand organizational human behaviour so that acquisitions and mergers are smooth.

## Significance of OB

- **Managing Workplace Diversity-** Work force diversity means that organizations are becoming more heterogeneous in terms of gender, which varies from the so-called norm. It includes women, south Indians, Bengalis, Punjabies , physically disabled, elderly etc.
- **Improving ethical behavior-** After understanding the mechanism of human behaviour, managers are required to control and direct the behaviour so that it conforms to the standards required for achieving the organisational objectives. Thus, managers are required to control and direct the behaviour at all levels of individual interaction. Therefore, organisational behaviour helps managers in controlling and directing in different areas such as use of power and sanction, leadership, communication and building organisational climate favourable for better interaction.

- **In define authority, power and status of an employee -** The behaviors can be controlled and directed by the use of power and sanction, which are formally defined by the organization. Power is referred to as the capacity of an individual to take certain action and may be utilized in many ways. Organizational behaviour explains how various means of power and sanction can ,be utilized so that both organizational and individual objectives are achieved simultaneously.
- **In making communication-** Communication helps people to come in contact with each other. To achieve organisational objectives, the communication must be effective. The communication process and its work in inter-personal dynamics have been evaluated by organisational behaviour.

- **Essential to effectively strategy implementation-**  
Organizations, as dynamic entities are characterized by pervasive changes. Organizations have to adapt themselves to the environmental changes by making suitable, internal arrangements such as convincing employees who normally have the tendency of resisting any changes.
- **It contains a body of theory** research, application associated when a growing concern for in work place. Its study helps in understanding human behavior. The study of theories and research experiences of organization facilitates manager for creative thinking to solve human problems in organizations
- **Information Technology gives power and information to the one who can use it best.**



- **The environment is changing rapidly making adaptation and change crucial to survival-organizations as closed systems isn't a valid model.**
- **Improving Quality and Productivity**
- **In making effective organizational structure**
- **In making group**
- **In motivation**
- **In organizational development**

# Evolution of OB

## **Robert Owen-(1800)**

- Young Factory Owner-First to emphasize the human needs of employees and refused to utilize children
- Taught workers to improve working conditions
- Father of personnel management

## **Andrew Ure-(1835)**

- The Philosophy of Manufacturers -1835
- Value of human factor in manufacturing
- Provided welfare facilities to workers
- J.N. TATA in 1886 Instituted a pension fund & 1895 began to pay accident compensation.

## **William Gilbreth-(1914)**

- “The Psychology of Management”

## **F.W.Taylor-(1916)**

- Father of Scientific Management
- Time & Motion Study
- Piece Rate Method

## **Henry Fayol (1916)**

- Administrative Management , Principle of Governing Behavior, Management Quality

## **Elton Mayo-(1920's & 1930's)**

- Human behavior at Harvard University
- Hawthorne's Experiments/Plant

## **Abraham H. Maslow (1954):**

- Need Hierarchy Motivation model

## **Douglas McGregor (1960):**

- Theory X and Theory Y Managerial Style

## **Henry Mintzberg (1960) :**

- Managerial Roles : Interpersonal, Informational and Decision making

## **Peter Drucker (1909 -2005)**

- Father of modern management
- Importance of change
- How to bring best out of people
- Innovation
- Entrepreneurship

# Organizational behavior system

- A set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem.
- An organized, purposeful structure that consists of interrelated and interdependent elements (components, entities, factors, members, parts etc.). These elements continually influence one another (directly or indirectly) to maintain their activity and the existence of the system, in order to achieve the goal of the system.
- All systems have (a) inputs, outputs and feedback mechanisms, (b) maintain an internal steady-state (called homeostasis) despite a changing external environment, (c) display properties that are different than the whole (called emergent properties) but are not possessed by any of the individual elements, and (d) have boundaries that are usually defined by the system observer.



# An Organizational Behavior System



# Basic Assumptions of OB

OB is also based upon few basic assumptions or fundamental concepts that revolve around the nature of people and nature of organizations.

**I. Individual differences:** When we look at a person outward, he/she looks similar to the other person. The same two upper limbs, two lower limbs, one head, one nose etc. If we go little deeper, we can easily distinguish one person from other person easily as they possess not only body but also mind and heart. Not just that every individual thinks, feels, imagines, sees, and dreams differently. Every individual has different priorities, perception and the way of expression. Each one possesses unique talents, intelligences, personality and so on. From the very beginning of life, each person is unique and individual experiences after birth make people even more different. Like a saying – ‘A Rose is A Rose is A Rose’, every individuals are unique and different. OB focuses on treating people with right discrimination.

**ii. A whole person** A person should be accepted as a whole person. Simply put, an individual possesses the four lives: personal, family, social and professional life. Sometimes, a person in workplace needs to be involved in family or community. S/He also involves in personal life besides the profession, family and social life. Hence, OB assumes that a person as whole person and focuses on developing him/her in terms of growth and fulfillment.

**iii. Caused (or motivated) behavior** Human beings do not exhibit behavior randomly; rather the behavior is caused by some motive, need, want or any drives. Always employee behavior is directed towards the goal and it can be caused by some motives, belief systems, perception, understanding, education, experience and environment.

**iv. Human Dignity (Self-Respect of People)** There are four dimensions of life in human beings as mentioned earlier: Body, Mind, Heart and the Spirit. Regarding the employee at work, Body says pay me fairly, Mind says engage me creatively, Heart says treat me kindly and the Spirit says assign me meaningful job so that I want to leave the legacy. Human dignity appeals for fair treatment to people. It calls for self-respect and value of people. People should be properly treated and given the value and recognition for their valued contribution.

**v. Organizations are social system** Organization gets established by human association. Like in social system, interrelation, interaction and interdependency between people continue till an organization exists. People are involved in organization to fulfill their psychological needs; they perform some definite roles and possess status. Hence, every activity in organization is governed by social laws and psychological laws.

vi. **Mutuality of interests** Organization needs people and people also need organization. There is a clear give and take relationship between people and organization. Collective efforts of people finally achieve the super ordinate goal and meanwhile organization fulfills the needs of its people.

vii. **Holistic Concept** The above six basic assumptions of OB are placed together, a holistic concept emerges. This concept interprets people-organization relationships in terms of the whole person, whole group, whole organization, and the whole social system. It takes an all encompassing view of people in organizations in an effort to understand as many of the possible factors that influence their behavior. Issues are analyzed in terms of the situation affecting them rather than in terms of an isolated event or problem.



## levels of OB analysis

Organizational behavior is a misnomer. It is not the study of how organizations behave, but rather the study of individual behavior in an organizational setting. This includes the study of how individuals behave alone, as well as how individuals behave in groups.

**1. Individual Level of Analysis:** At the individual level of analysis, organizational behavior involves the study of learning, perception, creativity, motivation, personality, turnover, task performance, cooperative behavior, deviant behavior, ethics, and cognition. At this level of analysis, organizational behavior draws heavily upon psychology, engineering, and medicine.

**2. Group Level of Analysis:** At the group level of analysis, organizational behavior involves the study of group dynamics, intra- and intergroup conflict and cohesion, leadership, power, norms, interpersonal communication, networks, and roles. At this level of analysis, organizational behavior draws upon the sociological and socio-psychological sciences.

**3. Organizational Level of Analysis:** At the organization level of analysis, organizational behavior involves the study of topics such as organizational culture, organizational structure, cultural diversity, inter-organizational cooperation and conflict, change, technology, and external environmental forces. At this level of analysis, organizational behavior draws upon anthropology and political science.

### **Emerging Challenges in the Field of OB**

1. Managing Workforce Diversity
2. Responding to Globalisation
3. Improving Quality and Productivity
4. Responding to Labour Shortage
5. Improving Customer Service
6. Improving People Skill

7. Empowering People
8. Coping with Temporariness
9. Stimulating Innovation and Change
10. Helping Employees Balance Work/Life Conflicts
11. Improving Ethical Behaviour

**Workforce Diversity:** Organizations are becoming increasingly cosmopolitan. Organization specialist must learn to live with diverse behaviors. Managers must learn to respect diversity. Diversity if managed positively enhances creativity and innovation in organization as well as ensures better decision-making by providing different perspectives on problems. When not managed, diversity leads to increased turnover, heightened inter-personal conflict and more strained communication.

**Changed Employee Expectation:** Traditional allurements such as job security, attractive remuneration housing does not attract, retain and motivate today's workforce. Employees demand empowerment and expect equality of status with the management. Empowerment results in redefining jobs, both from the shop floor as well as the boardrooms. Expectations of equality break up the traditional relationship between employer and employee – top to bottom.

**Globalization:** Growing internationalization of business has its impact on people management. Managements are required to cope with the problems of unfamiliar laws, languages, practices, competitors, attitudes and management styles, work ethics and more. To face this challenge the management must be flexible and pro-active. Being flexible and pro-active the management can make significant contribution to the company's growth.

- Internationalization makes managers to increase their competencies.
- Globalization increases the number of managers and professions.

**Improving Productivity and Quality:** As organizations are exposed to competition, managers are seriously thinking of improving quality and productivity. In this context managers are implementing programmes like TQM (Total Quality Management) and Re-engineering programmes that requires employee involvement. TQM is a philosophy of management that is inspired by constant attainment of customer satisfaction of all organizational process. Re-engineering means radically re-building and redesigning those processes by which we create value for customers.

**Changing Demographics Of Workforce:** Major challenges from changing demographics of workforce relate to dual-career couples. Couples where both partners are actively pursuing professional careers. The increase in number of dual career profession limits individual flexibility and may hinder organization flexibility in acquiring and developing talent. Another change in the workforce demographics relates to the growing number of employees who are young.



**Learning Organizations:** The concept of 'learning organizations' was first presented by Peter Senge. According to his concept, employees, who are committed to an organization, work harder and produce better results. That's why he proposed that organizations should invest in their employees and facilitate the learning of their members. As a result of that, the organization actually develops and transforms itself.

**Competing with the Low-Cost Labor:** Another great modern challenge in management is to find a way to minimize cost of operations. So you can compete with the low-cost labor that many other countries can afford. You may or may not have the luxury of having a labor at \$1 per hour. But it is a fact you must understand that many other countries do have this option.